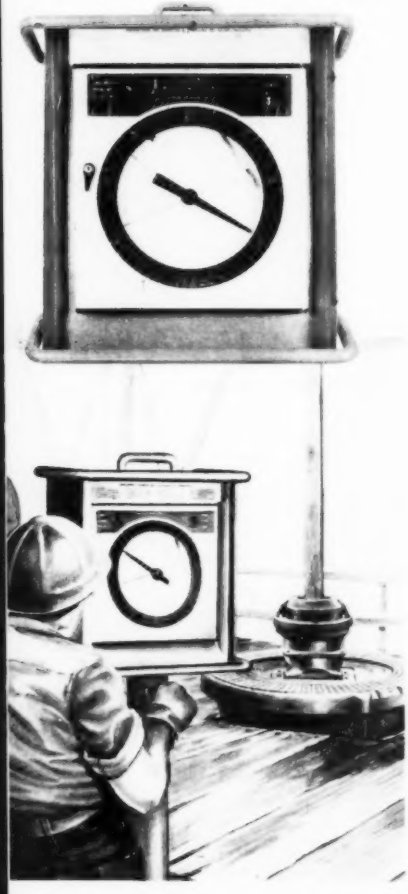
the OIL AND GAS JOURNAL

NEW BJ weight indicator

Takes Accurate Bit Load Readings

RIGHT WHERE LOAD on the BIT OCCURS!



THIS NEW BJ Electronic Weight Indicator indicates and records weight on bit from a pick-up located at the swivel bail adapter—*right where control load on the bit occurs!* Indications are entirely unaffected by deadline whip, sheave friction or similar variables. *Any movement of the indicator reflects an actual change in weight on bit — a vitally important point in accurate drilling control.*

The new BJ Weight Indicator reads directly in thousands of pounds, and provides both weight on bit and total load indications and recordings. It gives your driller the vital information he needs to efficiently drill better wells at less cost.

For accuracy you can count on...for simplified installation...for trouble-free operation...and for space-saving compactness...it will pay you to investigate the new BJ Electronic Weight Indicator today. See your nearby BJ Representative — or write for bulletin giving full details.

BJ MEANS ENGINEERED OIL TOOLS

Byron Jackson Co.

Main Office & Plant: Los Angeles 54, Calif.
Mid-Continent Office & Plant, Houston 1, Texas
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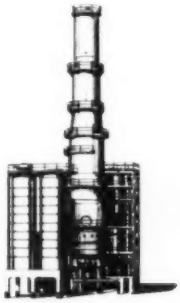
STOCKING JOBBERS ALL PRINCIPAL OIL FIELDS

PRICE 50 CENTS

TABLE OF CONTENTS PAGE 53

APRIL 13, 1950

Need
STAINLESS STEEL
for corrosion-resistance in
TANKS or PRESSURE VESSELS?



If so, let us quote on solid stainless, stainless-clad or stainless-lined equipment fabricated to meet your specific requirements

When it's stainless tanks or pressure vessels you want, pick your fabricator as carefully as you pick the type of steel. This is what we offer you—years of experience fabricating various types of stainless—welders and technicians who know how to overcome the problems encountered in the use of this metal—four plants located to give prompt service anywhere in the nation. We also offer the same skill and service for the fabrication of such non-ferrous alloys as monel, nickel, and aluminum. Write our nearest office for full information or a quotation.

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3 ..... 2154 Healey Bldg.
Birmingham, 1 ..... 1536 North 50th St.
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Chicago, 4 ..... 2128 McCormick Bldg.
Cleveland, 15 ..... 2204 Guildhall Bldg.
Detroit, 26 ..... 1514 Lafayette Bldg.
Havana ..... 402 Abreu Bldg.
Houston, 2 ..... 2119 National Standard Bldg.
Los Angeles, 17 ..... 1523 General Petroleum Bldg.
New York, 6 ..... 3347—165 Broadway Bldg.
Philadelphia, 3 ..... 1615-1700 Walnut Street Bldg.
Salt Lake City, 4 ..... 525 West 17th South St.
San Francisco, 11 ..... 1254—22 Battery Street Bldg.
Seattle, 1 ..... 1325 Henry Bldg.
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Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe, Limited, Darlington, England
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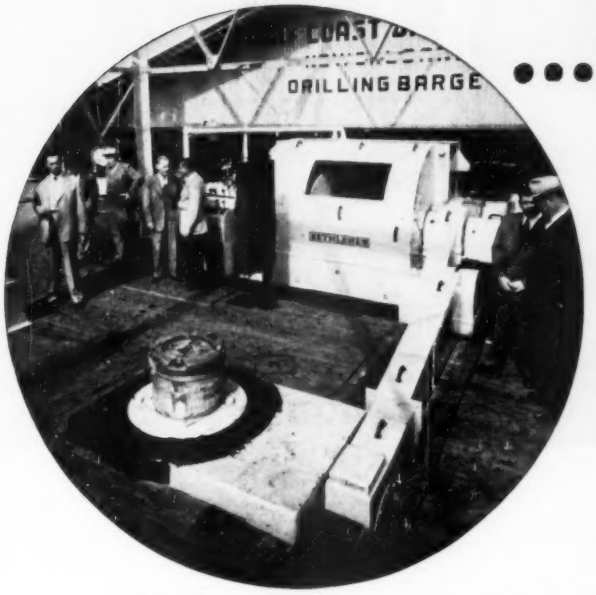
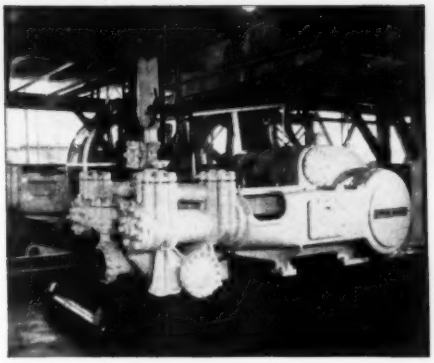
Comprimo N.V., Amsterdam—O, Netherlands

No split responsibility ...no worries

WHEN YOU ORDER YOUR COMPLETE DRILLING BARGE JOB FROM BETHLEHEM



▲ D-Day (Delivery Day) for an all-Bethlehem barge job. The months of planning, building, equipping are over. She's ready to go.



Powerful G-600 pumps will handle the mud circulation. Other items of Bethlehem drilling equipment aboard include draw works, blocks, swivel, rotary, and mud-mixing pump. ▶

Instead of multiplying barge-building problems—get rid of them. Instead of having one company build your vessel, another furnish the drilling equipment, and eight or ten others the incidental items . . . let Bethlehem handle *everything*. Barge, drilling machinery, accessories, even the piping-up—we'll handle them all, from the blueprint stage to the final ceremony of turning the job over to you.

Bethlehem's organization has had wide, well-rounded experience in the design and construction of drilling barges. Combined with this experience is that of Bethlehem Supply Company, one of the great builders of rotary-drilling equipment.

When you decide to place the entire order in our hands, you automatically sidestep the worries, mix-ups, and complications that a "split" job entails. Just as one example: the purchase of accessories. This can mean headaches—but not if Bethlehem's purchasing division is working for you. Its members know what, where, and how to buy for marine equipment; been doing it for years.

If you were buying an automobile, you wouldn't buy the engine here, the body there, the wheels somewhere else. Isn't it as sensible to apply the one-point-of-purchase rule when you're figuring a drilling barge? Especially when Bethlehem has the wealth of experience you demand on such work?

We'll be mighty glad to tell you what we can do—and have done—along these lines. Just say the word and we'll be there!

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY
Shipbuilding Division
GULF COAST YARDS: BEAUMONT, TEXAS

BETHLEHEM SUPPLY COMPANY
GENERAL OFFICES: 21 E. SECOND ST., TULSA, OKLA.

Subsidiaries of Bethlehem Steel Corporation

Where EROSION is a problem...

GUN IRON CASTINGS

The hardness and dense, close-grained structure of Gun Iron is ideally suited to give long resistance to erosion or corrosion. When required, this resistance can be further increased by heat treatment and/or proper alloys.

Gun Iron has been used to combat casting erosion on a number of widely varied applications. A typical example is in the case of main cylinder liners in marine diesel engines. Where the coolant water is drawn directly from the sea, the chemical impurities cavitate the liners to the point where they are useless long before they are worn out. Gun Iron liners satisfactorily withstand this erosion and at the same time give longer wear on the cylinder wall. The savings in maintenance and replacement costs reported by users are tremendous.

Gun Iron also provides exceptional resistance to prolonged heats, impact and pressure. The proof of Gun Iron's superiority when used for parts subjected to these problems has been dramatically illustrated thousands of times in the last 139 years. To help determine the specific value of Gun Iron for *your* strategic cast parts, our engineers and complete laboratory facilities are at your disposal. Our furnaces, foundry and extensive machining facilities stand ready to produce them accurately and economically.

GUN IRON *in the* PETROLEUM INDUSTRY

Hunt-Spiller casts and machines many parts for the petroleum industry. A few are listed below:

LINERS, PISTONS AND RINGS FOR HOT OIL PUMPS • BUBBLE CAPS AND TRAYS • TUBE SUPPORTS • PRESSURE CASTINGS

Chances are that there are many other places where Gun Iron can solve a design or operating problem. To help you determine the value of Gun Iron for your cast parts, our metallurgical department has prepared a comprehensive bulletin which contains complete properties and discussions of Gun Iron and many other metals. Engineers claim it an invaluable reference aid. Send for your free copy today.

HUNT-SPILLER GUN IRON • AIR FURNACE PROCESS • HSGI

HUNT • SPILLER MANUFACTURING CORPORATION

393 DORCHESTER AVENUE • SOUTH BOSTON 27, MASS.

Canadian Representatives: Joseph Robb & Co., Ltd., 4050 Namur St., Montreal 16, P. Q.

How twin grommets reduce belt failures

B.F.Goodrich grommet V belts last 20 to 50% longer

WHEN an ordinary V belt enters the sheave, the center cords are forced down and away from the center where the load is carried. Belt men call this "dishing" because the cord section becomes concave like a dish. With the new B. F. Goodrich V belt there are no center cords, no "dishing." Here's how it works —

All cords are put to work — Twin grommets are placed close to the driving faces of the belt. All the time the belt is in the pulley, the grommets keep working close to the driving surfaces. The load is evenly distributed. In laboratory tests, grommet V belts actually lasted 20 to 50% longer.

Every part is flexible —Because a grommet V belt has no stiff overlapping section, every part is equally flexible. Better grip, less slip. Grommet V belts give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Endless grommets reduce belt failures — Most of the failures in ordinary belts occur where cords overlap. But in the B. F. Goodrich grommet V belt the cord section is *endless* — made by winding heavy cord on itself to form an endless loop. These are twin cord sections, *not ordinary cables.*

No other V belt has it — Twin grommet construction is found only in B. F. Goodrich V belts. (U. S. Patent No. 2,233,294.) It's a premium construction feature that costs you no more. At present made in D and E sections only. Ask your local B. F. Goodrich distributor to show you his "X-ray" belt that clearly illustrates grommet construction. *The B.F.Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Grommet V Belts BY
B.F.Goodrich

PROVED

PIPE-LINE PROTECTION

costs no more

WHY gamble with *unproved* methods of pipe-line protection when Koppers Bitumastic® Enamels offer you the longest-lived corrosion prevention you can obtain.

The base of Koppers Bitumastic Enamels is highly-refined coal-tar pitch, a substance that has demonstrated its resistance to water and chemical action for more than 100 years. Special processing by Koppers adds to this coal-tar pitch base the characteristics of plasticity, widened temperature susceptibility ranges and increased resistance to soil distortion.

Since the first Koppers Bitumastic Enamels for pipe lines were introduced more than 35 years ago, Koppers has set the pace in new developments in pipe-line protection. Records of 30 and more years of service are evidence that Koppers Bitumastic Enamels are the best protection you can buy. And the cost is exceptionally low.

Koppers sales engineers will give you complete details and estimates on this permanent pipe-line protection. Contact your Koppers representative today.

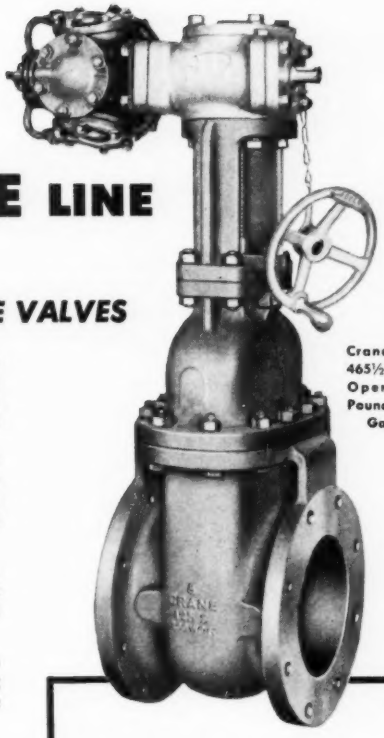
KOPPERS BITUMASTIC® ENAMELS

REG. U.S. PAT. OFF.

KOPPERS COMPANY, INC., Tar Products Division, Dept. 403T, Pittsburgh 19, Pa.

ANSWER TO A SPECIFIC NEED NOW IN THE CRANE LINE

NEW, LOW-COST FLUID-MOTOR OPERATED GATE VALVES



Crane 8-inch No. 465½ Fluid-Motor Operated 125-Pound Iron Body Gate Valve.

These valves fill the need for a power-actuated pipe line control at lower than usual cost. By utilizing a simplified fluid motor, they permit wider application of mechanically-operated valves to increase plant efficiency.

Low in first cost . . . low in operating cost . . . Crane Fluid-Motor Operated Valves save labor, help prevent accidents and offer definite advantages when installed on hard-to-reach valves or on valves used in timed operating cycles.

OPERATE AT LOW COST—Crane Fluid-Motor Operated Gates utilize pressure sources readily available in most plants—compressed air, water, or oil . . . at pressures ranging from 40 to 300 psi.

HIGH STARTING TORQUE—Motor is reversing type and is designed to exert greater torque when unseating the valve than when seating it. Added power to open valve against sticking is assured.

NO WASTE OF POWER . . . NO LOSS OF FLUID—Pressure-tight motor stalls when disc is in fully open or closed position. Motor can remain stalled indefinitely . . . under full pressure . . . with no leakage of operating fluid. No power is wasted in maintaining fluid at proper operating pressure.

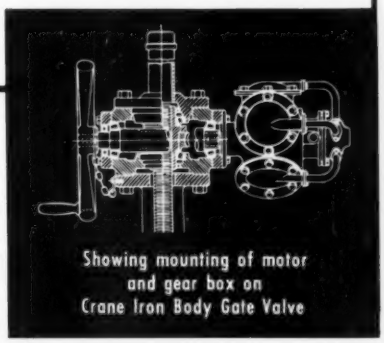
Crane Fluid-Motor Operated Valves are now available in the following pressure classes, types and sizes:

25-pound wedge disc gate	**12-in. to 30-in.**
125-pound wedge disc gate	**5-in. to 20-in.**
25-pound double disc gate	**10-in. to 30-in.**
100-pound W.O.G. double disc gate	**6-in. to 24-in.**
A.W.W.A. double disc gate	**4-in. to 20-in.**
Pulp Stock Valves	**8-in. to 20-in.**

How Crane Fluid-Motor Works

Radial-type motor has five diaphragm sealed chambers. Operating fluid, admitted through a 4-way distributing valve, acts against diaphragms to exert force against pistons. The pistons, in turn, transmit the thrust to an eccentric which causes drive shaft to rotate. Hammerblow device in gearbox allows motor to attain speed before loading and provides impact to overcome friction of valve parts.

Send for this descriptive folder—See how Crane Fluid-Motor Operated Gate Valves can help increase the operating efficiency of *your* plant. Ask your Crane Representative for your copy, or WRITE FOR FOLDER AD-1803. No obligation.



Showing mounting of motor and gear box on Crane Iron Body Gate Valve

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

EVERYTHING FOR EVERY PIPING SYSTEM

CRANE

VALVES • FITTINGS • PIPE • PLUMBING AND HEATING

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1950.

Where temperature control is a must

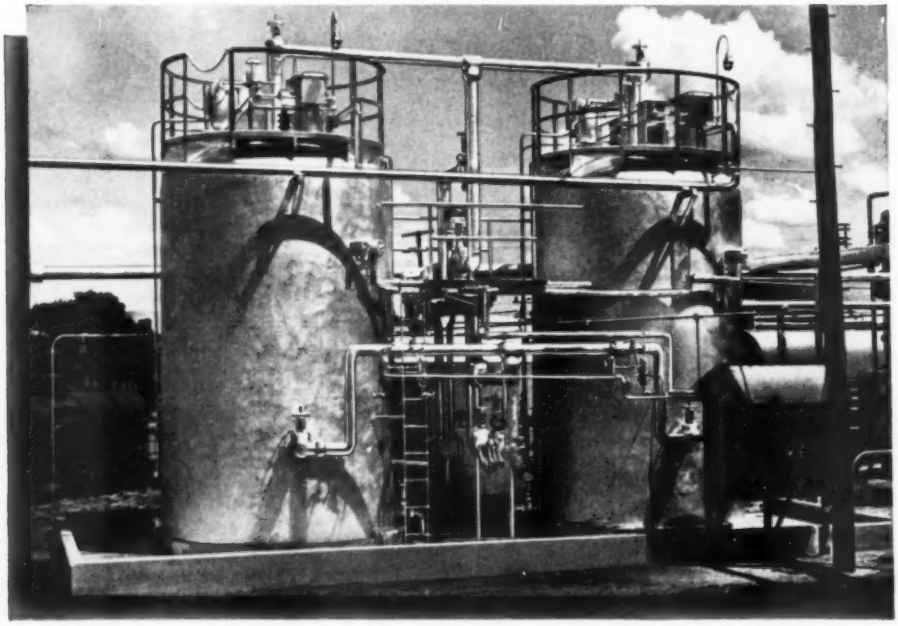
K&M "FEATHERWEIGHT"® 85% MAGNESIA INSULATION

When your problem is complex . . . when you need the answer to accurate temperature control and high insulation value . . . you can depend on K&M "Featherweight" 85% Magnesia to take its full share of responsibility.

This dependable heat insulation assures high non-conductive efficiency that lasts. Its advantages come from the scientific K&M method of compounding clean asbestos fiber with basic carbonate of magnesia, in correct proportions—with proper distribution. The result is lightweight pipe and block insulation whose structural strength contributes to application and maintenance savings.

"Featherweight" 85% Magnesia, available in all standard dimensions, is one of the many types of insulation produced by K&M. Investigate them by obtaining full data and expert information from your nearest K&M Distributor.

Owner: Midland Cooperative Wholesale Refining Co., Cushing, Oklahoma.
Equipment: Desalters and Piping. ***Contractor:*** Armstrong Cork Co.
Insulation: K&M "Featherweight" 85% Magnesia—Weatherproofed.

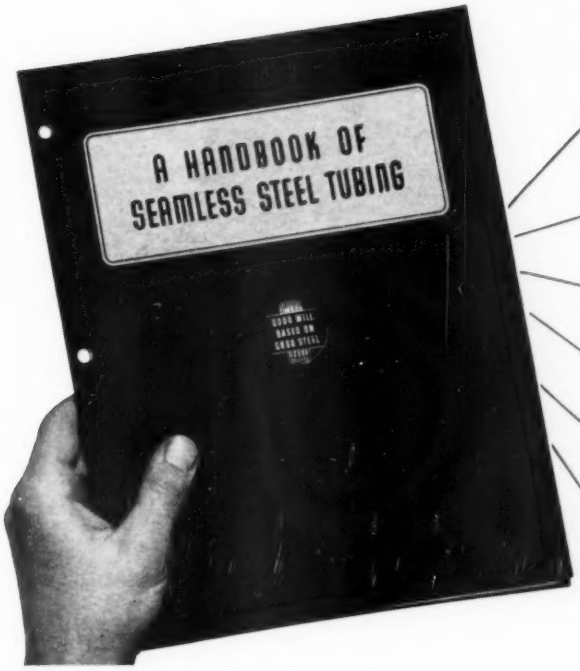


Nature made Asbestos . . .
Keasbey & Mattison has made it serve mankind since 1873

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

K&M best in asbestos®

New 52-page handbook for makers of hollow parts!



Advantages of tubing for hollow parts

How to plan for less waste

Tubing types and sizes

Surface finishes

Mill tolerances

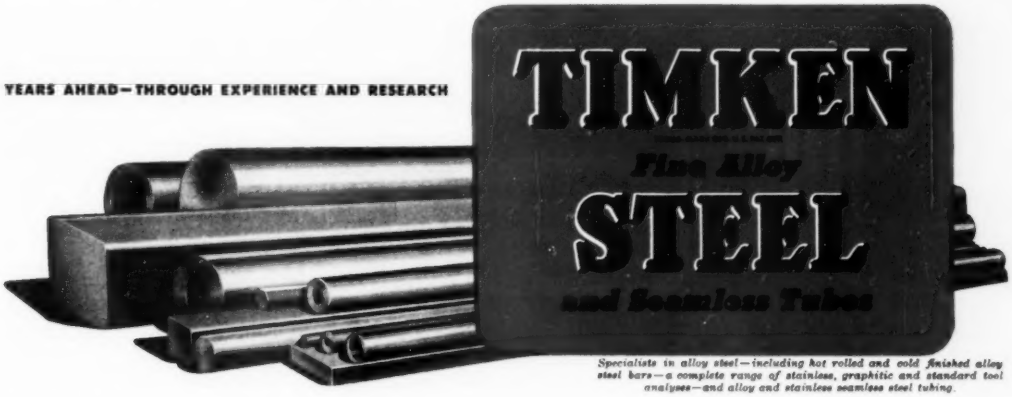
Allowances for machining

IF you're looking for ways to improve quality and cut costs in making hollow or circular parts, this 52-page handbook will prove a gold-mine of information.

It tells how you can save machining time, reduce scrap loss and boost production through the use of Timken® seamless tubing. It shows why the fine forged quality of Timken tubing gives you a better product—with uniform grain flow, stronger all the way through. It gives all the details you need to know about types and sizes of tubing and surface finishes. It shows how to plan for minimum waste—gives thickness, straightness and concentricity tolerances and tells what allowances to make in choosing the most economical tubing for your job. There's a lot more information as well—tables, formulae and other technical data that you'll find of constant value.

You need this handbook for your files now. For your free copy, write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



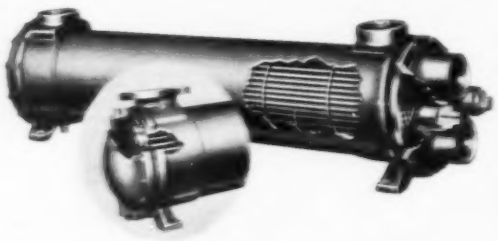
Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

This is News!

NEW LOW PRICES OPEN WAY FOR WIDE USE OF ALL-CUPROUS REMOVABLE BUNDLE EXCHANGERS

Redesign and Mass Production Set Costs Lower Than Many Iron and Steel Shell Units

BUFFALO, N. Y.—Extensive redesign of the Ross Type BCP Exchanger, famed for its service on U. S. Navy combat vessels, opens the way for industry-wide use, announces Ross Heater & Mfg. Co.



New, low prices now make an all-copper and copper alloy, removable tube bundle unit available at a considerable saving over cast iron and steel shell units, especially in the smaller sizes, and at competitive costs in many of the larger sizes.

These developments are predicted to have an extremely favorable effect, of far reaching proportions, on both original equipment manufacturers furnishing exchangers as accessories, and industries utilizing exchangers in their own plants.

Boosts larger transfer surface in same size unit

Full standardization and quantity production, bringing about the new, low prices, were not the sole objectives and results of the redesign, Ross points out. Sharing the limelight is the substantial increase in heat transfer surface.

In many instances, a smaller, less expensive Ross Type BCP now serves the same conditions that formerly required a larger, costlier exchanger of conventional design. Passages between tube bundle and shell, that normally remain unused, are filled with an extra ring of tubes in the new Type BCP. By thus eliminating a short circuit of fluid around effective tube surface, and by introducing an improved, close tolerance baffle system, Ross has achieved better fluid distribution, hence increased transfer surface. Tubes, even though there are now more of them, have not decreased in size.

Production system speeds shipments

Typically, Ross-standardized and Ross-quantity-produced components and sub-assemblies of Type BCP Exchangers are being carried in stock. Quick assembly to standard or individualized specifications, therefore, enables quick shipments.

Offers informative, new literature

Now ready for distribution is a colorful new bulletin (No. 2.2K1) describing and illustrating in detail the design features of the new Ross Type BCP. Copies will be forwarded without charge to anyone requesting on company letterhead.

ROSS

ROSS HEATER & MFG. COMPANY, INC.

Division of American Radiator & Standard Sanitary Corporation

1417 West Ave. Buffalo 13, N. Y.

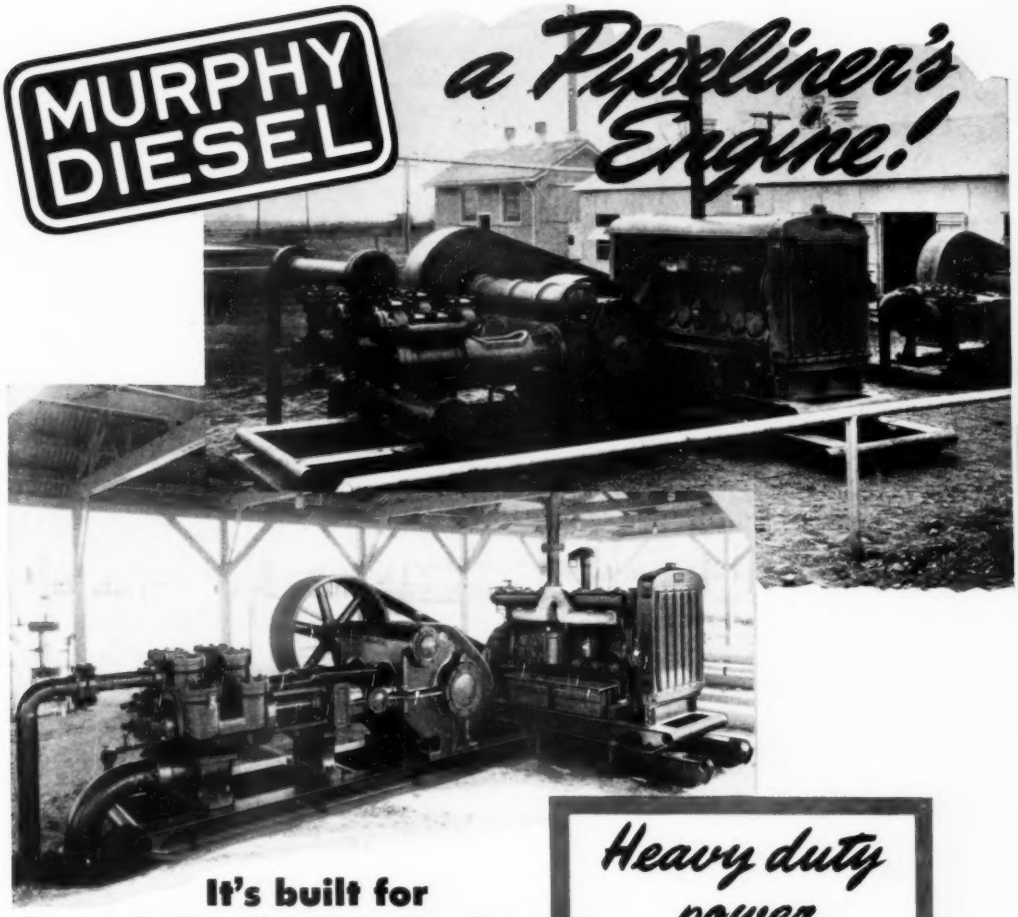
In Canada, Horton Steel Works, Limited, Fort Erie, Ont.

Serving home and industry

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

MURPHY DIESEL

a Pipeliner's Engine!



It's built for 'round-the-clock operation

Economy and dependability — that's the combination that makes Murphy Diesel the answer to a pipeliner's needs. With unit fuel injection and "true" diesel operation — solid fuel injected directly into a plain, open combustion chamber — the Murphy Diesel uses less fuel per horsepower hour than *any* other diesel of comparable power rating. Dependability is assured by quality workmanship and an exclusive combination of design features such as... four valves per cylinder... extra large crankshafts and bearing surfaces... hydraulic servo-type governor... through steel tie bolts... oil cooled pistons... dual overhead camshafts ...and many others.

Heavy duty power

for the oilfields

Murphy Diesel Engines and Power Units for pipeline pumping and drilling, 90 to 220 H. P. Diesel-Electric generating Sets 60 to 133 K.W. Diesel, Dual-Fuel, Crude Oil.

Before you buy your next diesel for pipeline pumping service be sure and look into the advantages of Murphy Diesel Power. Ask your Murphy Diesel Dealer for full details or write direct.

MURPHY DIESEL COMPANY

5305 W. Burnham St., Milwaukee 14, Wis.

FACTORY BRANCH — Sales, Parts and Service: 113-117 South Elwood Street, Tulsa, Oklahoma

There's no better proof of effective, economical dehydrating performance than industry-wide acceptance and usage. The petroleum industry knows, and uses

Tret-O-lite

You can't get better dehydrating reagents — no one can give you better service. If you have other production problems, ask about THESE Tretolite products:

CORROSION INHIBITORS

SCALE PREVENTIVES

PARAFFIN REMOVERS

WATER DE-OILERS

TRETOLITE COMPANY

Manufacturing Chemists

TM-3

ST. LOUIS 19, MISSOURI • LOS ANGELES 22, CALIF.

For Top Flight Gas Welding

Choose from AIRCO'S complete line of Oxyacetylene Welding Supplies

Time Proved . . . Job Tested . . . Money Saving

Available from Local Stocks

That's right! Whether you use a popular Airco gas welding rod, flux, or brazing alloy for production or maintenance operations . . . you're certain of top-notch work—ask any one of the thousands of welders who swear by these Airco oxyacetylene welding supplies.

This well-recognized reputation for top performance didn't just happen—more than thirty years' experience and development have gone into the manufacture of these outstanding gas welding supplies . . . know-how that produces high quality, reasonably-priced items that guarantee a job done faster, done better, done easier and done at less net cost.

For further information about Airco's oxyacetylene welding supplies which includes a complete line of rods, fluxes and brazing alloys, write your nearest Airco Office or Authorized Dealer for a free copy of Catalog 12.

More news about AIRCO products

AIRCO No. 1 ALLOY STEEL

A Smooth-Flowing, High Ductile Rod Insuring Good Control of Molten Pool

This rod (AWS Classification GA60) is ideal for welding low carbon and low alloy steels, including pipe of grades A and B analysis. Outstanding among its many important features is the high ductility in the "as welded" condition. Because of its mechanical properties, this rod is desirable when undertaking qualification tests like those included in The American Standards Association Code for Pressure Piping. It is smooth flowing, insuring good control of the molten pool, and, in addition, will withstand considerable heating without burning.

PHOS COPPER

A High Standard Copper And Phosphorous Brazing Alloy

It is self-fluxing when used on copper-to-copper joints but requires a good low melting point flux when brazing brass, bronze or other alloys. It is completely fluid at approximately 1382°F. at which temperature best results are secured and is used in the manufacture of electrical, refrigeration and air conditioning equipment. Available in rod and strip form.

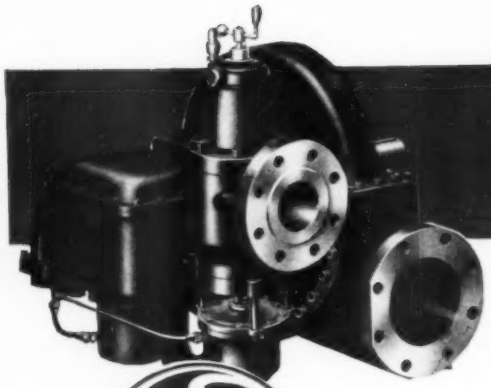
AIRCO MARVEL BRAZING FLUX

A High Quality Flux That Remains Molten And Viscous Over A Wide Temperature Range

It is a uniformly high-quality flux for use in braze welding cast iron, malleable iron, copper and steel and for welding brass, bronze and copper. Marvel Flux remains molten and viscous over a wide temperature range. Its use protects the weld metal from oxidation and effectively reduces or removes oxides and other foreign matter. Marvel Flux is a general purpose flux for the welding shop.

AIRCO **AIR REDUCTION**

Offices in Principal Cities



SAVE

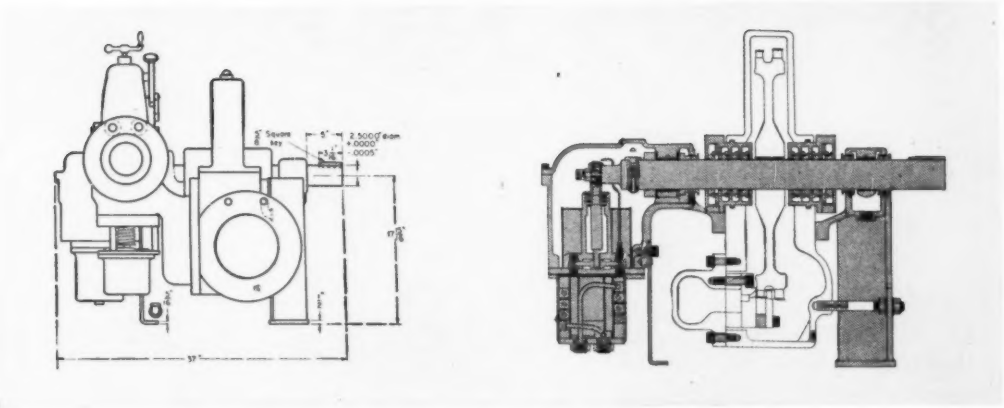
GE TYPE DP

General Electric's DP turbines, available in three frame sizes and a variety of ratings, can be profitably used in many different applications, yet they compose a standard line and incorporate standard parts. This standardization gives you four important benefits:

1 EASY TO STOCK SPARES Because most parts are interchangeable on all models, spares can be stocked at low cost. A spare parts kit, containing 91 items, can be obtained with the turbine. This simple method of stocking spares lowers maintenance costs and provides protection for several DP's in your plant.

FOUR WAYS

WITH Standard Turbines



2 INSTALLATION SIMPLIFIED

All models, regardless of frame size, horsepower, or speed ratings, have identical shaft height, keyways, and coupling fits. Thus, installation problems are simplified, and you can move these center-line supported units from job to job without a "custom line-up."

3 GREATER FLEXIBILITY

As the shaded parts in the diagram illustrate, most DP parts are identical on all frame sizes and ratings. In this way, you can adapt a DP for different job requirements with only minor changes. A different nozzle plate gives you a different horsepower output. A change in governor gears provides a new speed range. When modernization programs demand a change in plant operation, the DP's flexibility will save you money.

4 A BETTER TURBINE

Manufacturing savings from standardization are passed on to you in the form of special features at no extra cost. For instance: hydraulic governing, combined trip-throttle valve, 30% speed range are advantages you'd expect to find only in custom equipment.

Ask your General Electric representative for full details about the DP mechanical-drive turbine or write for bulletin GEA-4955. Get the full details on how standardization will benefit your plant operation. Apparatus Department, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

252-45

Quality Pays Off!

When your well calls for long-stroke pumping . . . with thousands of feet of tubing above your subsurface pump . . . anything less than the best is poor economy! That's when you need the advanced engineering and precision workmanship of . . .

Illustrated above is a Neilsen 2½" x 2¼" x 30' I-R Metal Sectional Liner Barrel Tubing Pump being run in a 5,779' well located near Brookhaven, Mississippi. This pump is equipped with a 5' I-R Metal Plunger of .003 fit. There are 5,732' of tubing above this pump, which is being operated with a 246" stroke at 8 S.P.M. to produce an average of 900 to 1000 bbls. total fluid per day, of which 135 bbls. per day is oil.

Neilsen Long-Stroke Pumps for Installation ANYWHERE

WHEN it was first realized that long-stroke hydraulic pumping units offered distinct advantages in pumping deep wells, Neilsen Pump Division of Oil Well Supply Company, installed suitable equipment for honing pump barrels of extreme lengths . . . so that the many exclusive quality features of Neilsen I-R Metal Sectional Liner Streamline-Flow Subsurface Pumps would be available for these deep-well pumping applications, where quality is so important.

In the past, applications of long-stroke pumps have, because of the transportation problems involved, been restricted to easy-to-reach locations near the factory.

Now . . . a means has been perfected whereby extra long Neilsen I-R Metal, Sectional Liner Barrel, Tubing Pumps . . . such as the 30' barrel shown at the left . . . can be transported in two pieces and reconnected at the well site; retaining the exact "factory honed" alignment. This makes it possible to ship these quality pumps to the most remote locations without endangering their performance.

MORE AREA · LESS FRICTION · MORE VOLUME

Neilsen I-R Metal Sectional Liner Barrel Tubing Pumps, combine high strength, corrosion resistance and low turbulence. They have standard A.P.I. dimensions and are equipped with streamlined fittings. I-R Metal is extremely hard, excellent in corrosion resistance, and has a very low coefficient of friction. Neilsen I-R Metal Plungers can be operated against I-R Barrels without seizing—thus avoiding temperature difficulties and making this the most outstanding Subsurface Pump material known.

If you have a long-stroke pumping problem let one of "Oilwell's" skilled Subsurface Pump Representatives, assist in selecting and running the Neilsen long-stroke pump that will give maximum performance and service in your well—regardless of location.

OIL WELL SUPPLY COMPANY

Branches Serving All Oil Fields

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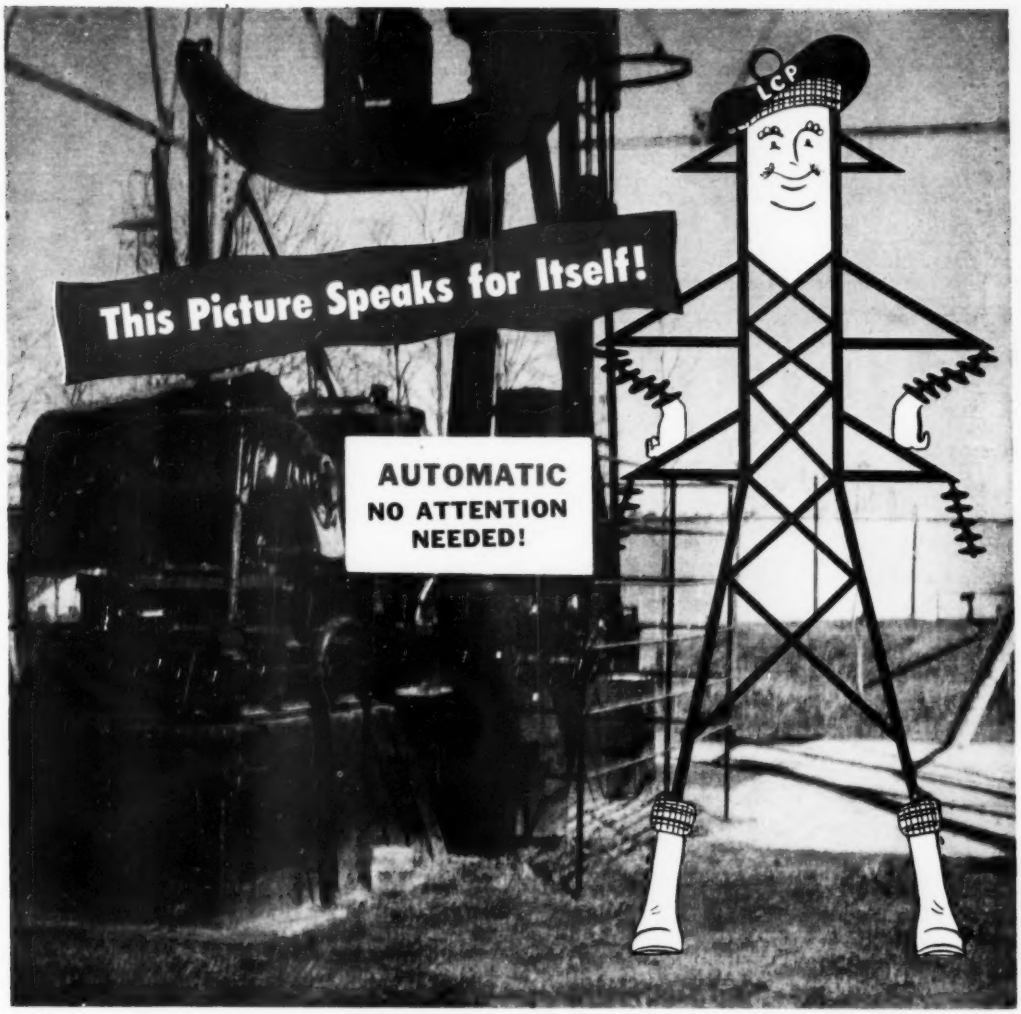
USS "OILWELL"

UNITED STATES STEEL



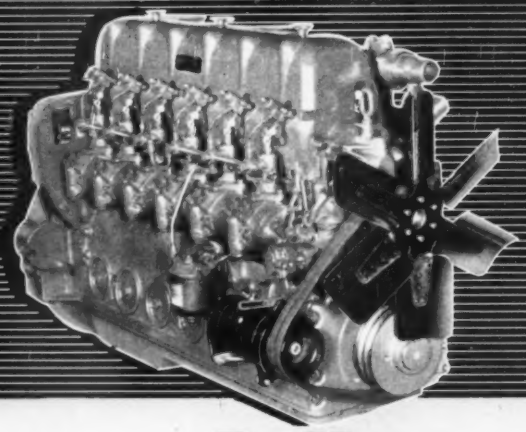
MORE and MORE WELLS ARE PUMPED BY *LCP EVERY DAY!

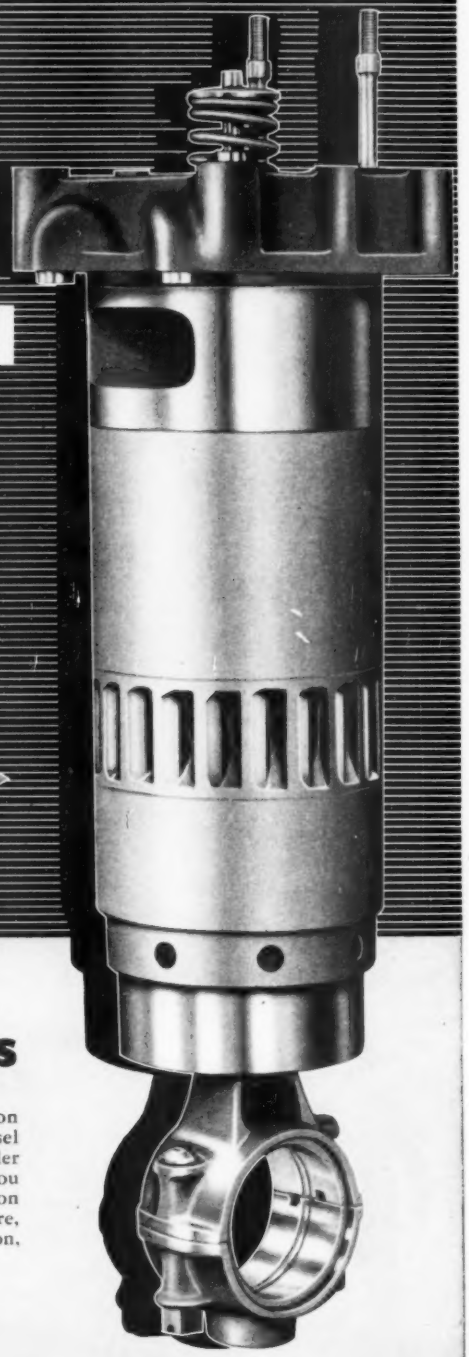
Yes, sir . . . that's me they're talking about . . . *LCP! My AUTOMATIC CONTROL releases manpower, cutting payroll costs. Continuous, trouble-free operation reduces maintenance costs, too. I can take on 24-hour duty or work according to any fractional time schedule—that means you pay only for the power you use. Switch to tireless automatic *LCP! I'll do the job better—for less! Ask the Power Engineer of your Utility Electric Power Company—he'll tell you!

*LOW COST POWER

PETROLEUM ELECTRIC POWER ASSOCIATION

simplified design



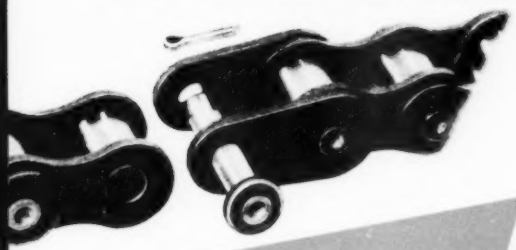


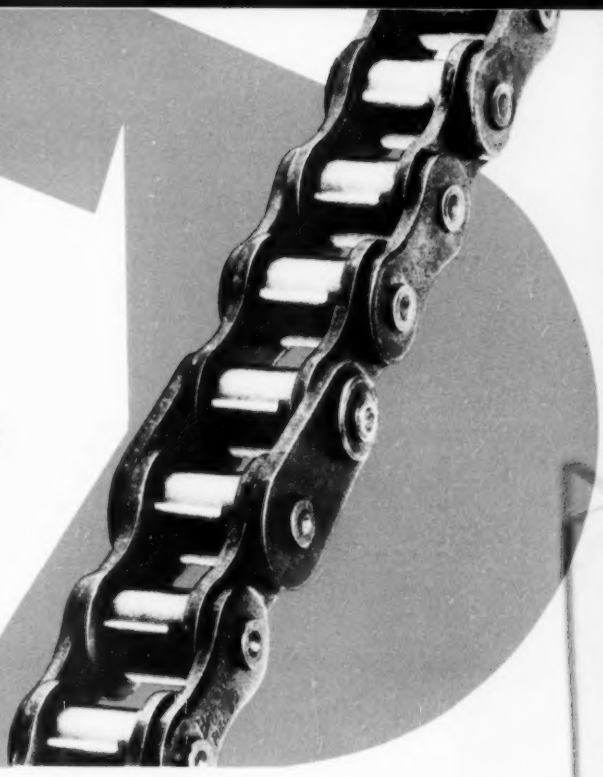
P&H
DIESEL ENGINES
(2 Cycle)

The complete assembly of cylinder head, liner, piston and rod is interchangeable as a unit in *all* P&H Diesel engines — 1, 2, 3, 4 or 6-cylinder models. Simpler design with fewer parts saves you time — saves you trouble — saves you money. It's another good reason for standardizing on P&H Diesels. For literature, write Diesel Division, Harnischfeger Corporation, Port Washington, Wisconsin.

P&H DIESEL DIVISION
HARNISCHFEGER CORPORATION
PORT WASHINGTON WISCONSIN U.S.A.

THE *RIGHT* CONNECTION FOR LONG, LOW-COST DRILLING SERVICE





The single pin connector link of the Baldwin-Rex "BA" Assembly, makes possible a new *high* in chain life . . . a new *low* in chain cost in Riveted Oil Field Roller Chain!

Now, with the "Baldwin-Assembly" you can get all the advantages of riveted roller chain . . . longer life, lower cost, greater strength. And, you get even easier assembly and disassembly than with old-style detachable roller chains.

You can see it for yourself. Note the washer spun over the head of the pin, the milled flat on the cottered end and the special hole in the connector plate. This combination holds the pin firmly in place, yet it is easy to remove because it is a "sliding" fit through the entire link except for the milled flat end.

You can easily remove this pin without destroying press fits or damaging chain parts.

And, an important additional advantage . . . the other end of the single pin connector link is firmly riveted to the adjacent link. When the single pin connector is removed, this riveted pin holds chain parts together, preventing plates from falling out, thus simplifying assembly.

Two single pin connector links are assembled with each five feet of "BA" chain. This assembly, plus standard 3-pitch repair units, makes it easy for you to make adjustments and repairs in the field.

For the complete story on the Baldwin-Rex "BA" Assembly, Rex A.P.I. Chains and Rex Oil Field Pumps, see your local supply store or write Chain Belt Company, 1619 W. Bruce Street, Milwaukee 4, Wis.

BALDWIN·REX

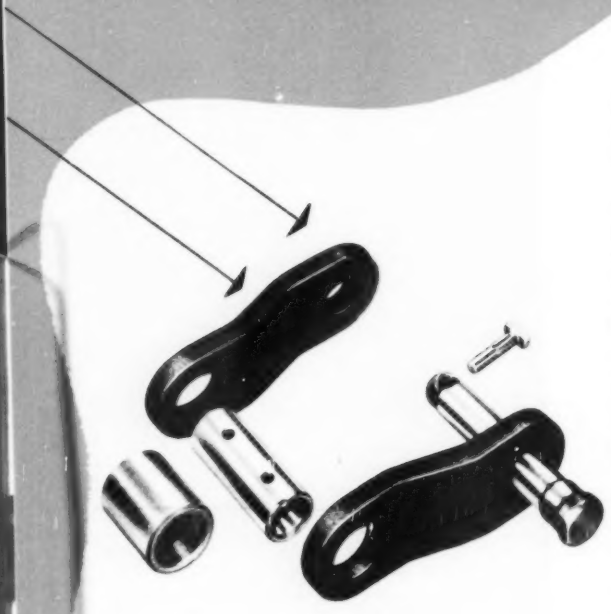
ROLLER CHAINS

a complete line from ¼-inch to 2½-inch pitch

THESE PARTS STAY *PUT*

FOR DEPENDABLE DRILLING SERVICE . . .

Rex Champion No. 3. Other A.P.I. sizes, Rex Champion No. 4, Rex Deepwell No. 3 and No. 4, Rex Chabelco No. 3125.



Under the toughest of drilling conditions you can expect Rex A.P.I. Chains to stand up . . . to deliver dependable, low-cost service.

The reason is not easy to see but is easy to understand. Pins, rollers, bushings and side bars are made of high quality steel and are carefully heat-treated to develop maximum strength. Then, these precision-made parts are accurately machine-assembled to form the famous Rex Unit link. Each link is exactly alike . . . each is *put together to stay* . . . to retain its strength and uniformity under the most adverse operating conditions.

Rex A.P.I. Chains have many other advantages that are important to you. Side bar holes are machine-finished for accurate pitch and to assure full bearing between parts. There are no sharp corners to start cracking and quick loosening of the pin. The Rex Effective Lubrication System gets oil where it is needed for long life. The Rex Balanced Design balances the strength of chain parts for efficiency . . . longer life . . . lighter weight.

For A.P.I. chains that give you more, standardize on Rex!

CHAIN BELT REX COMPANY

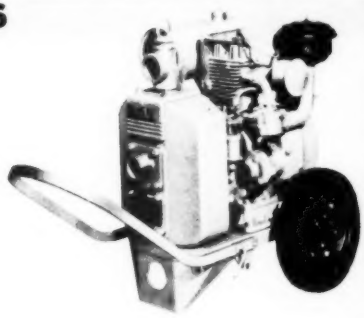
OIL FIELD UTILITY PUMPS

THE ONLY PUMPS THAT GIVE YOU NEW PUMP EFFICIENCY FOR THE LIFE OF THE PUMP

Only Rex Oil Field Utility Pumps give you the adjustable "air peeler" and replaceable wearing plate that assure top efficiency and capacity *for life.*

When normal wear takes place, the peeler can be adjusted from the outside of the pump to compensate for the wear, thus restoring original efficiency. The wearing plate is easily and simply replaced when this step becomes necessary. The peeler also enables the pump to handle vapor bearing liquids without losing its prime.

Rugged construction, exceptional all-round portability, and light weight make these Rex Self-Priming Centrifugal Pumps preferred for oil field utility service. They are available in a wide range of sizes and capacities.



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CHAIN BELT COMPANY

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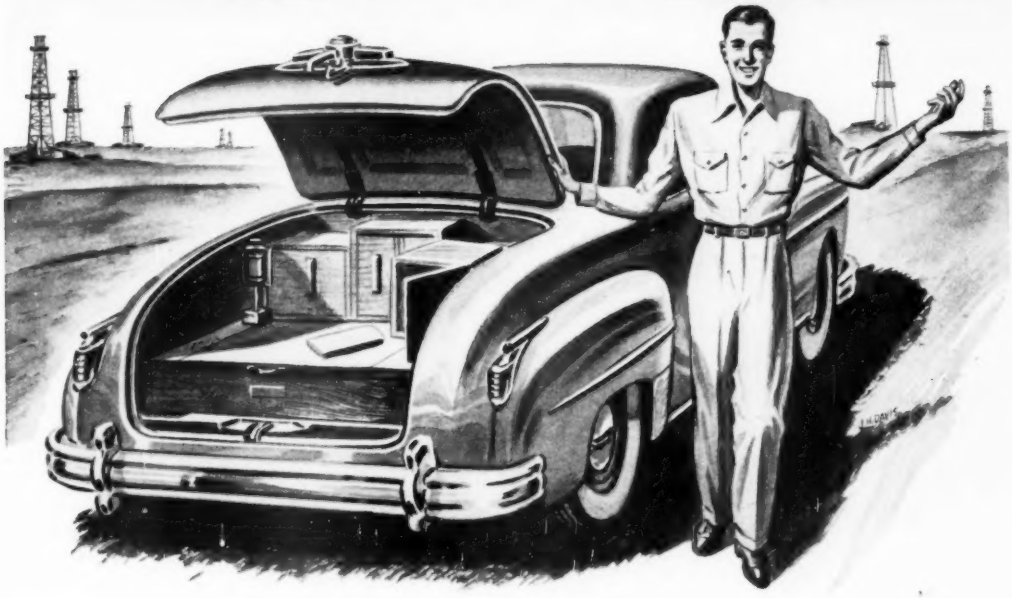
HERE COMES YOUR BAROID SERVICE MAN!



Are you puzzled by a mud that doesn't "act quite right?"
Do you want a complete, money-saving mud program outlined before you spud in?
Do you want immediate help with such serious troubles as blowouts, lost circulation?

Your Baroid service engineer has the answer to these and scores of other drilling mud problems. He knows muds and he knows drilling. He is trained and experienced in both (he may have worked on one of your wells before becoming a mud engineer). More than one operator has said that Baroid service men have freed many of their own engineers to attend to other duties.

When the Baroid engineer arrives, take a good look at the testing equipment cabinet built into the rear of his familiar blue coupe. Even the cabinet work is better than it was a year or more ago. The equipment has improved right along with the demands made upon it by more equipment. The Baroid engineer now can carry complete testing equipment units from his car, boat or plane, to the rig or shelter or wherever best to make his tests. This means faster, more accurate mud tests on your well. Baroid's service standards are the highest in the industry. With the Baroid service man's know-how and fine equipment working together, you can be sure of his answers.

Whatever Your Mud Problem . . .

ASK THE BAROID MAN!

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Send me detailed information on BAROID FIELD SERVICE.

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BAROID FIELD SERVICE

BAROID SALES DIVISION **NATIONAL LEAD COMPANY**
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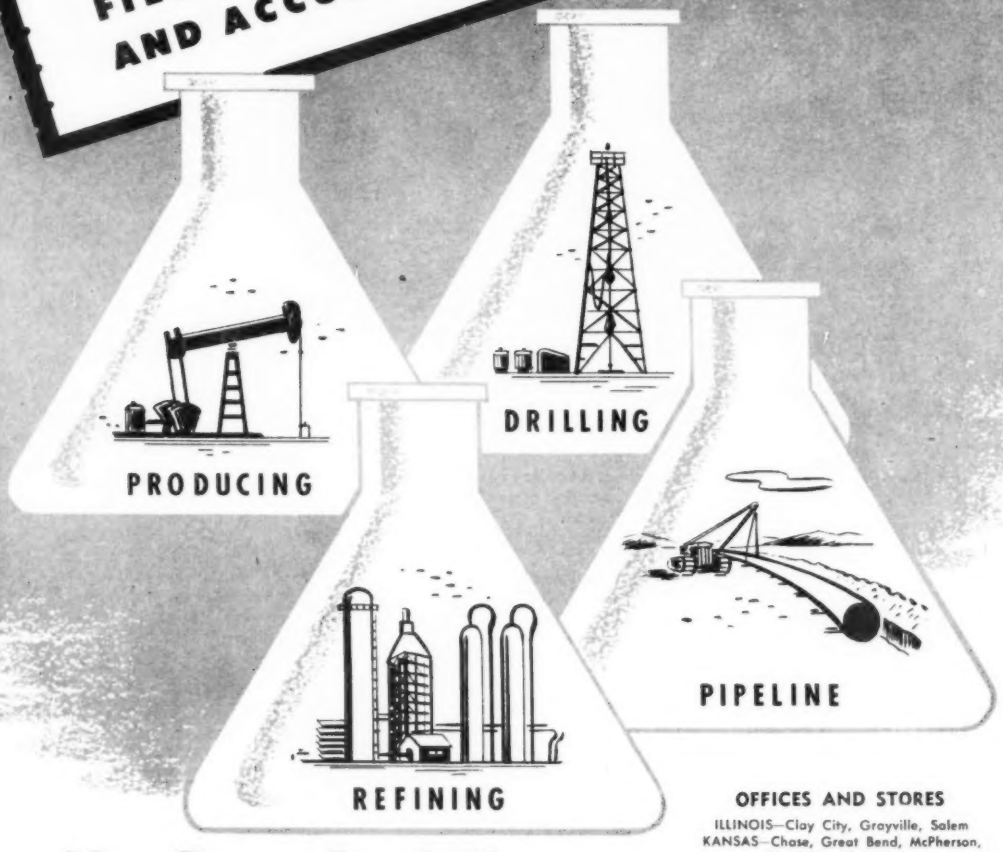
Rx OIL FIELD PRESCRIPTIONS FILLED QUICKLY AND ACCURATELY

SUPPLY BOVAIRD COMPANY



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THE Bovaird SUPPLY CO.

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Offshore rigs last longer with "CORO-GARD" Anti-Corrosion Coatings

BEFORE. Only 8 months of normal exposure to salt water spray and immersion caused this conventional coating to fail. Another application will be necessary at once, in order to prevent extreme damage to rig framework and equipment. A costly job that can be avoided.

AFTER. Protective coating of "Coro-Gard" being applied to offshore drilling platform substructures and capbeams. Careful compounding of this synthetic coating guards vulnerable metal against brine, high humidity, petroleum impurities, many other corrosive agents—gives long protection.

Durable Coating Systems Cut Maintenance Costs

Here's another large oil company that's saving money with "Coro-Gard" Protective Coatings! Service life of offshore drill rigs has been extended thanks to more complete protection against salt water, high humidity and abrasion.

There are 15 basic "Coro-Gard" Coating Systems, each designed for specific service conditions. There's one to meet *your* corrosion or abrasion problem.

WRITE FOR FREE advice on metal conservation problems. Our engineering service will be glad to suggest the proper "Coro-Gard" Coatings. No obligation. Address: Minnesota Mining & Mfg. Co., Adhesives and Coatings Div., 411 Piquette Ave., Detroit 2, Mich.

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ANTI-CORROSION COATING

Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Brand Pressure-sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives.

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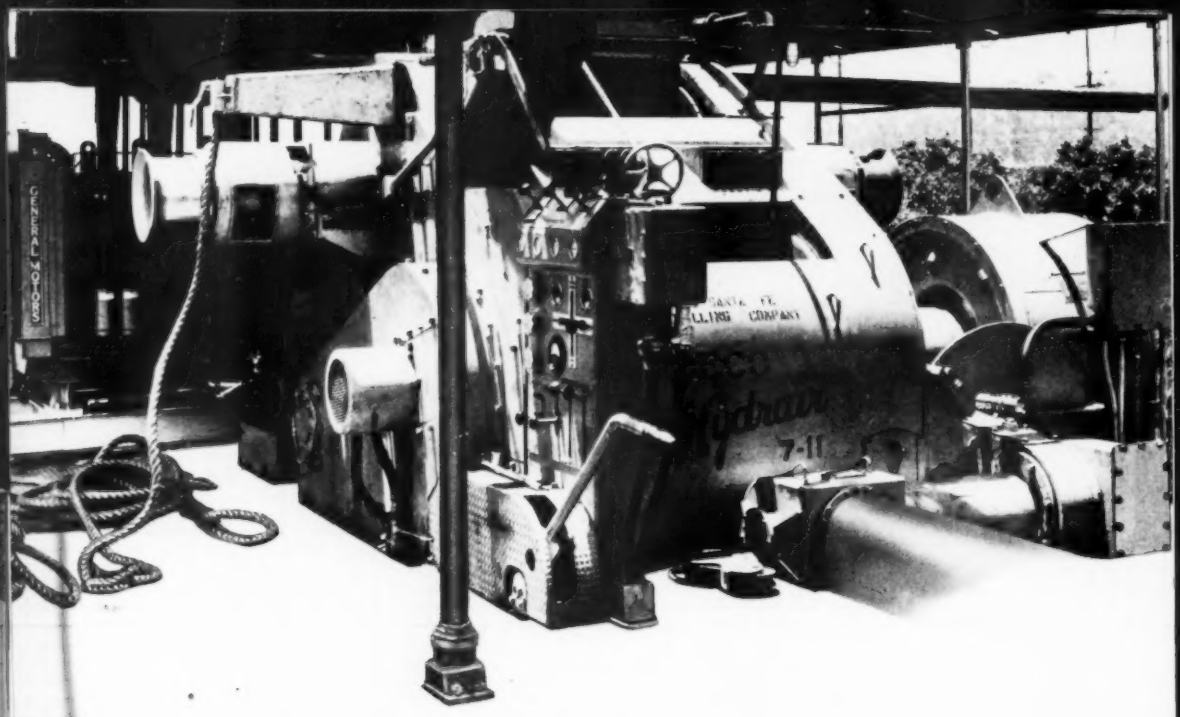


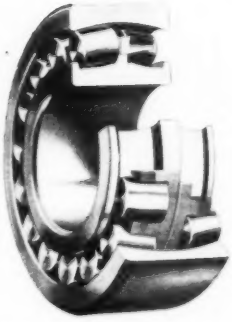
backing up a 25-ton line pull

TORRINGTON SPHERICAL ROLLER BEARINGS

In IDECO's Hydrair 7-11 Rig, heavy loads on compound, transmission, drum and cathead shafts are handled smoothly and efficiently by Torrington Spherical Roller Bearings.

The large area of roller-to-race contact is uniformly maintained and shafts turn freely even when momentary overloads cause deflection.

These features of heavy-duty Torrington Spherical Roller Bearings assure long service life with minimum maintenance. Our engineers will welcome an opportunity to help you secure these advantages for your product.



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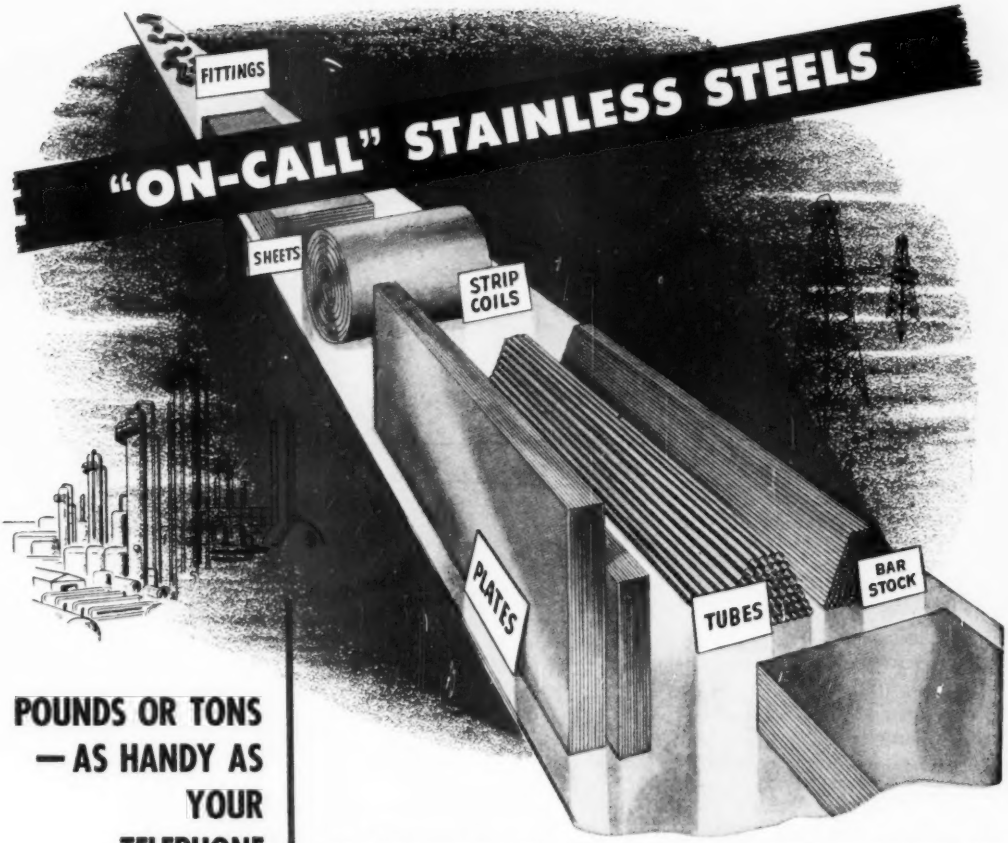

POUNDS OR TONS — AS HANDY AS YOUR TELEPHONE

ONE CALL SERVICE FOR ON-CALL METALS

To supply the specialized needs of the petroleum industry for corrosion-resistant stainless steels and stainless steel products, your Metal Goods warehouse carries a large stock of these essential specialty metals. Many different grades and types can now be furnished from stock—without delay. A few of these are:

***Type 316** for higher corrosion resistance under reducing conditions.*
***Types 321 and 347** for welding applications.*
***Type 410** in strip and sheet for vessel linings.*

Sheets • Plates • Bars • Tubes • Castings • Fittings

We also stock the accessories you'll need to complete your job:
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Types for special applications, although not normally stocked in warehouses, can also be supplied by us at no extra cost.

Metal Goods warehouses are strategically located in the heart of the Midwest and Gulf Coast refining industry — ready to serve you quickly and dependably.

Monel* • Nickel* • Inconel* • Aluminum • Brass • Copper

Plus complete stocks of condenser and heat exchanger tubes... Admiralty... Alclad Aluminum... 70/30 Super-Nickel... Monel.

Tube Sheets... Naval Brass... Muntz Metal

Not Warehoused in Kansas City or St. Louis* **Fittings and Accessories

Consult your Metal Goods metallurgical specialist on the proper metal for your application. *Phone, wire or write your Metal Goods warehouse for your specialized metal needs. Do you have your "Metalog"? It's a complete stock list and metal manual. Write for it!*

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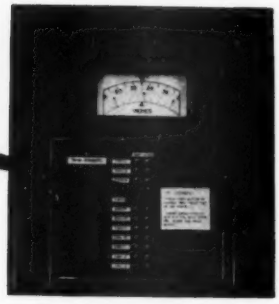
Now Press a Button

Get an Accurate Tank Reading Electronically



The S.&J. push-button Receiving Cabinet will accommodate up to 12 tanks. Note large reading dial with large triangular pointers and double hairlines to eliminate parallax errors.

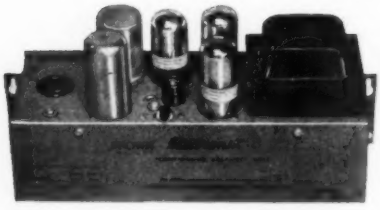
The new Shand & Jurs Electronic Precision Remote Reading Tank Gauge System will gauge your tanks accurately to one-eighth of an inch, from 0′ to 50′. This system employs standard S.&J. Automatic Tank Gauges adaptable for use on all types of storage tanks, both low and high pressure. The heart of the system is the Brown* "Continuous Balance" Electronik Precision Indicator which utilizes the balanced Wheatstone Bridge principle. In the S.&J. installation a pair of 1000 ohm potentiometers is used in the transmitter.

This new system uses a 110V A.C. source, reduced to 6.3V for energizing the measuring circuit. The low voltage used puts this system in the class of communications equipment, and permits the use of small gauge wire. It presents no new circuits or complicated electrical mechanism to worry personnel. Only four leads are required for each tank, and there are no field relays or junction boxes needed, as each transmitter is directly connected to the receiver. Low initial cost of equipment, field wiring and installation make S.&J. Electronic Precision Tank Gauging more economical than the selsyn or stepping type systems.

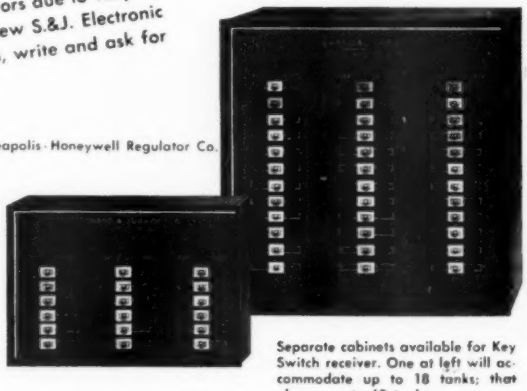
An important feature of this circuit is that at the balance point no current flows in the sliding contacts, thus errors due to varying resistance are eliminated. For details of this new S.&J. Electronic Precision Remote Reading Tank Gauge System, write and ask for our Bulletin RREG-1249.

The S.&J. Reading Cabinet for use with Key Switch system.

*Brown Instrument Div., Minneapolis-Honeywell Regulator Co.



The Brown* "Continuous Balance" Electronik Precision Unit which makes possible the extremely accurate tank gauging of the S.&J. Electronic Remote Gauging.

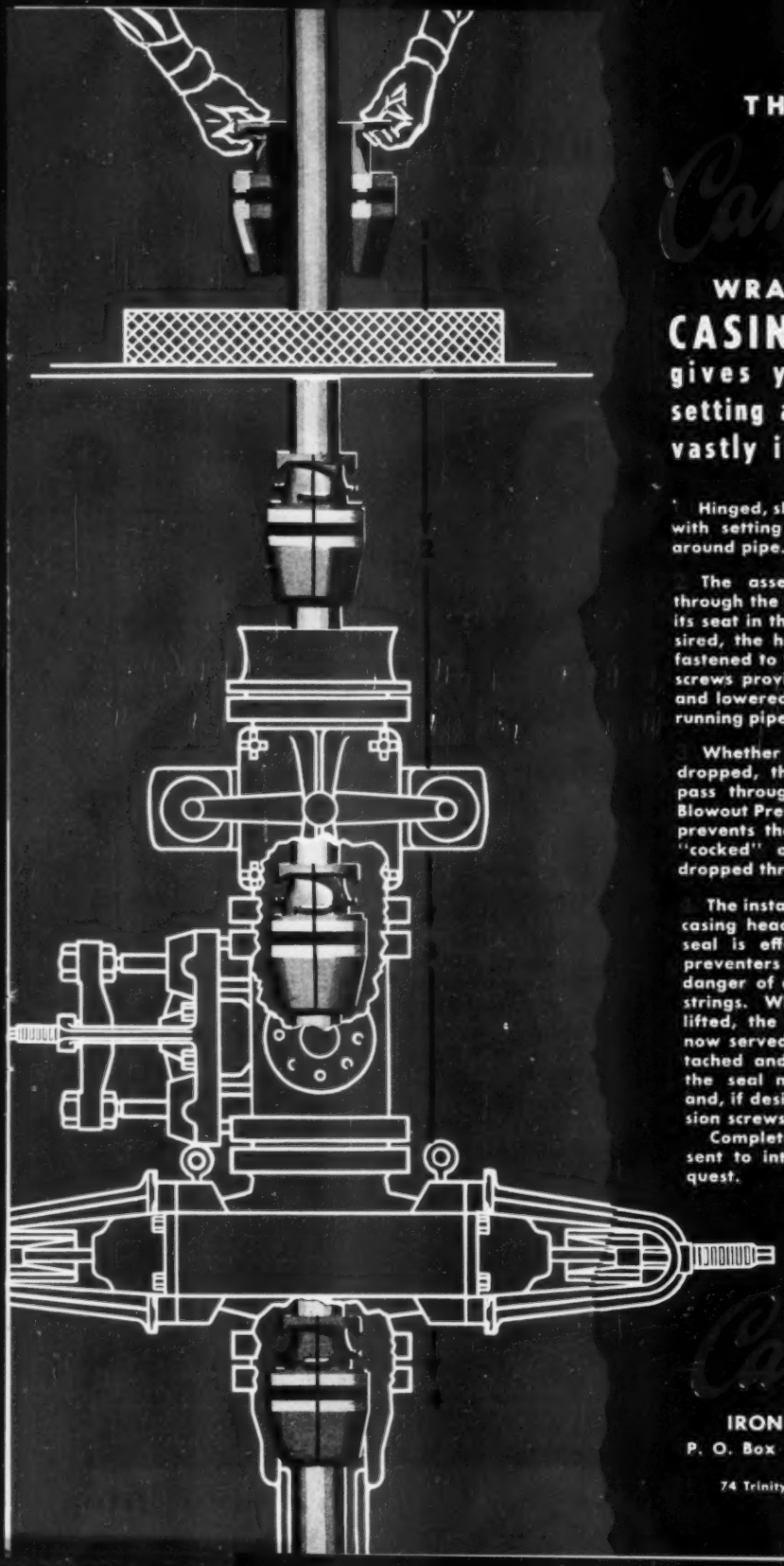


Separate cabinets available for Key Switch receiver. One at left will accommodate up to 18 tanks; that above, up to 60 tanks.

SHAND & JURS CO.
BERKELEY, CALIFORNIA

NEW YORK CHICAGO HOUSTON LOS ANGELES SEATTLE

SHAND & JURS



THE NEW

Cameron

WRAP-AROUND CASING HANGER

gives you automatic setting and sealing in a vastly improved design

Hinged, slip-type hanger assembly with setting guide is easily latched around pipe.

The assembly may be dropped through the rotary and preventers to its seat in the casing head. Or, if desired, the hanger assembly may be fastened to the pipe by means of set screws provided in the setting guide and lowered to the casing head while running pipe.

Whether fastened to the pipe or dropped, the hanger assembly will pass through full-opening Cameron Blowout Preventers. The setting guide prevents the hanger from becoming "cocked" on the pipe when it is dropped through the preventers.

The instant the hanger seats in the casing head the slips are set and a seal is effected *automatically*. The preventers may then be lifted without danger of a blowout between casing strings. When the preventers are lifted, the setting guide, which has now served its purpose, may be detached and discarded. At this point the seal may be readily inspected and, if desired, the packing compression screws may be tightened.

Complete details will gladly be sent to interested operators on request.

Cameron

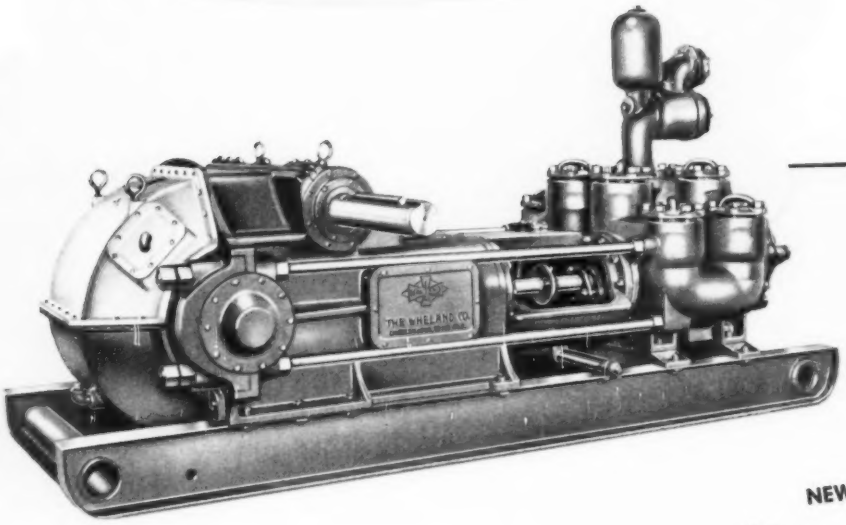
IRON WORKS, INC.

P. O. Box 1212, Houston, Texas

Export:
74 Trinity Place, New York, N. Y.

WHELAND HP-14000 POWER PUMP 7½ x 14"

It deserves a Halo!



NEW

HELICAL GEARS

POSITIVE LUBRICATION

HIGHER SPEEDS

EXCLUSIVE TIE RODS FOR EXTRA STRENGTH

GREATER HP CAPACITY

ONE PIECE CAST STEEL FLUID END

MOST ACCESSIBLE PUMP ON THE MARKET

REVERSIBLE PINION SHAFT

QUIET

ONE PIECE ALLOY STEEL CRANK

ONE PIECE ALLOY STEEL CONNECTING RODS

"TELL TALE" HOLES IMMEDIATELY DETECT PACKING LEAKS

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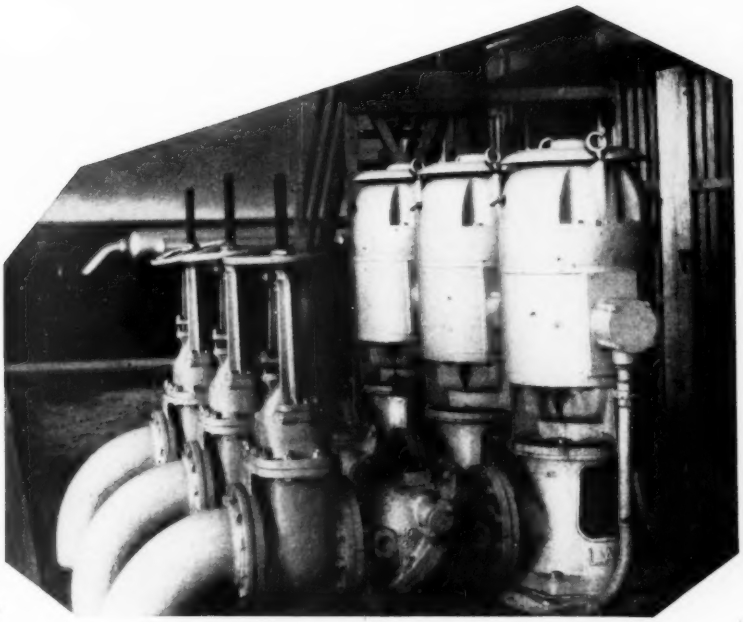

VERTICAL TURBINE PUMPS

—are built in sizes from 40 to 16,000 gallons per minute. They may be installed in existing wells, saving the expense of a new drilling job. Other uses include fire protection, booster service, cooling tower, river pick up and a wide range of other uses. Send for the Layne Vertical Turbine Pump catalog.

GIVING YOU MORE

Good Features

Industrial Plant Superintendents, Water Works Engineers and Municipal Executives throughout the nation readily agree that Layne Well Water Systems and Layne Vertical Turbine Pumps have more good features than any other make. Such acceptance is due to Layne's extraordinarily fine designing, precision manufacturing and definitely superior installation methods. Furthermore there is a distinct advantage in owning water producing equipment built by an organization that is always ready and in a position to provide efficient repair and maintenance service when—and if needed. Hundreds of large water users of all kinds have found Layne equipment to be thoroughly dependable under every condition.

If you are in need of more water or want to consider the installation of a system of your own, the Layne organization is ready to offer experienced exploratory service, sound engineering advice and dependable construction plans. You incur no obligation in asking for this aid. For such service, catalogs, bulletins, etc., address

LAYNE

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GENERAL OFFICES, MEMPHIS 8, TENN.

BUILDERS OF HIGH EFFICIENCY

WELL WATER SYSTEMS

ASSOCIATED COMPANIES—Layne-Arkansas Co., Stuttgart, Ark ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ The Layne-Texas Co. Ltd., Houston, Tex. ★ Layne-Western Co., Kansas City, Mo. ★ Layne Minnesota Co., Minneapolis, Minn. ★ International Water Corp., Pittsburgh, Pa. ★ International Water Supply, Ltd., London, Ont. ★ Layne-Hispano Americana, S.A., Mexico, D. F ★ General Filter Company, Ames, Iowa.

DEPENDABILITY THROUGH

TWO MILES OFFSHORE: Running 2900 ft. of 45.5-lb. round-thread high-yield A.O. Smith Casing in Galveston Bay.

RESEARCH AND ENGINEERING

ON THE MISSISSIPPI: A.O. Smith Casing can be shipped by barge as well as by rail. This barge load is going down river to Louisiana.

76th ANNIVERSARY 1876 1950

A.O.Smith
CORPORATION

CASING • LINE PIPE

Atlanta 3 • Chicago 4 • Dallas 1 • Denver 2 • Houston 2
Los Angeles 14 • New York 17 • Pittsburgh 19
Seattle 1 • Tulsa 3 • Washington 6, D.C.
International Division: Milwaukee 1

REDUCE PIPE LINE MAINTENANCE COSTS with CHAPMAN

TILTING DISC

Check Valves

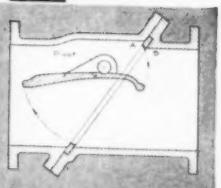
Because of their unique design, Chapman Tilting Disc Check Valves *close without slamming*. There is no water-hammer . . . no vibration of pipe lines or adjacent structure. Nor any danger of opening up pipe joints or rupturing pipe lines. All mighty important reasons why maintenance costs are bound to go down when you standardize on this valve with the cushioned closing.

Yet that's only part of the story. Chapman Check Valves also reduce head losses 65% to 85% over conventional type check valves. And, when installed on pump discharge lines, they not only make possible increased pipe-line capacity but also effect substantial power savings.

Why not send for bulletin with engineering data *today*?

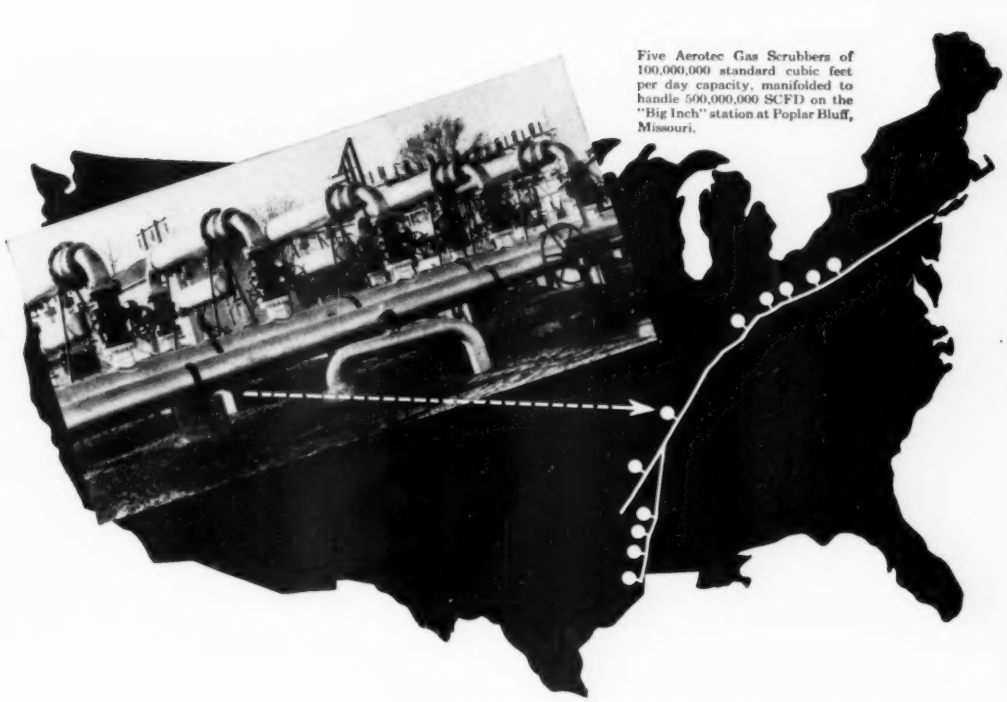
THE CHAPMAN VALVE MANUFACTURING COMPANY

INDIAN ORCHARD, MASSACHUSETTS



Cross-section of the Chapman Tilting Disc Check Valve illustrating the way that the balanced disc is supported on the pivot with arrows showing the travel of the disc. A feature of the design is that the disc seat lifts away from the body seat when opening, and drops into contact when closing, with no sliding or wearing of the seats.

TAMES A
POWER THROB
FLEXINEERING ELIMINATES VIBRATION ON TUG DIESEL EXHAUST
. . . PROVIDES SMOOTHER POWER . . . COOLER OPERATION
When the giant 16 cylinder, 1750 horsepower diesel engine of the new tugboat, Grace Moran, roars into action, there's a smooth purr of silky power. And one of the keys to this vibration-free operation is "flexineering"—the scientific engineering of flexible metallic tubing to industry's specific needs.
From the exhaust to the stack is a five foot length of Penflex air jacketed 14 inch, interlocked, flexible metallic tubing which achieves a circulation of air and an efficient cooling action. Tough, rugged tubing that keeps exhausts as tight as a pipe . . . yet provides all of the flexibility necessary to "soak up" the constant vibration.
Throughout the petroleum industry—from oil fields to marketing—new Penflex developments are revolutionizing the use of flexible metal tubing. Whether it's an exhaust, air or steam lines . . . or handling of liquids and volatiles, "flexineering" has the answer for you in the application of tubing from ⅛ I. D. on up to 24 inch I. D. . . . Write for your copy of "Flexineering." See what it has accomplished in the Petroleum Industry.
PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.
7213 Powers Lane
Philadelphia 42, Penna.
Branch Sales Offices
BOSTON • NEW YORK • CLEVELAND
CHICAGO • HOUSTON • LOS ANGELES
Penflex... HEART OF INDUSTRY'S LIFE LINES



Five Aerotec Gas Scrubbers of 100,000,000 standard cubic feet per day capacity, manifolded to handle 500,000,000 SCFD on the "Big Inch" station at Poplar Bluff, Missouri.

THE INDUSTRY SPECIFIES:

AEROTEC *Dry* GAS SCRUBBERS

On the "Big Inch" pipeline and at the wells, Aerotec Gas Scrubbers are performing with unparalleled efficiency the job of keeping pipelines free of dust, liquid and distillates.

Based on a dry process of separating foreign material from gas, the Aerotec method eliminates the need for a cleaning medium, insures a minimum carryover of foreign matter into the gas stream. Units are available in practically any size up to 100,000,000 SCFD. Larger capacities may be handled by manifolding these standard units to any desired capacity.

Acceptance of Aerotec Gas Scrubbers is best demonstrated by the rapidly growing list of new users. Repeat orders prove that the Aerotec method is setting a new standard for an industry where maximum efficiency is required.

Complete information on this new method is now available.
Write for Catalog 501-2W today!

Project and Sales Engineers

THE THERMIX CORPORATION

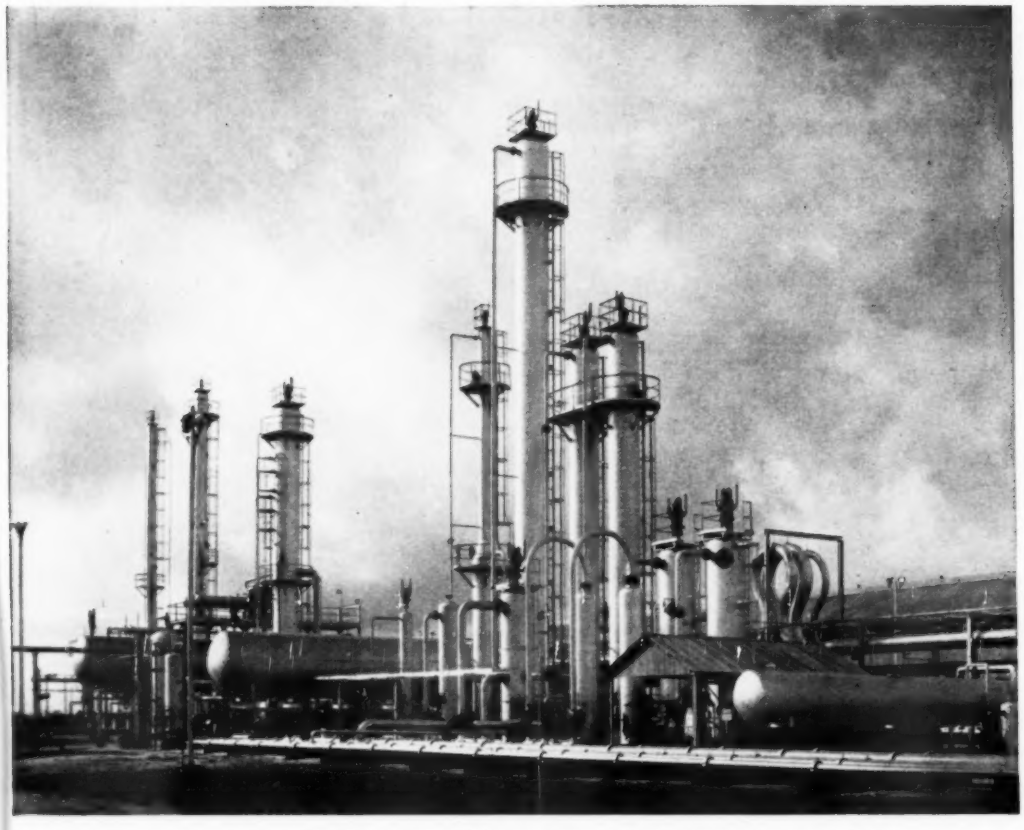
Greenwich, Connecticut

(Offices in 28 Principal Cities)

Canadian Affiliates: T. C. CHOWN, LTD., 1440 St. Catherine St., W., Montreal 25, Quebec

THE AEROTEC CORPORATION

GREENWICH, CONN.



. . . you can't beat the toughness and long life of PITTSBURGH FINISHES!

THERE are no better coatings for oil and gasoline property and equipment than Pittsburgh Finishes! Because they are remarkably resistant to corrosion and the elements these finishes assure dependable, rugged, low-cost protection.

No other finishes are formulated more accurately or tested more thoroughly at the factory and in the field to make certain their performance is as good as human skill and ingenuity can make it.

Typical of this high quality are Pittsburgh's Aluminum Paints and Paint Liquids. These finishes have been preferred for many years by many companies in the petroleum industry because of their heat and light reflection, high hiding and durability.

Pittsburgh Aluminum Finishes contain vehicles which are specially formulated to retain the brilliance and leafing of the aluminum pigment upon aging.

The Aluminum Paints are ready for use without need to mix pigments and vehicles. The vehicles are also available for those who wish to mix the ingredients on the job.

Pittsburgh also offers Tankhide and Ironhide for the protection of metal structures as well as other special finishes for service and bulk stations, pumps and drums.

Call on us for expert advisory service. Our wide experience in making coatings for the petroleum field may be helpful to you—and save you time and money.

• • •

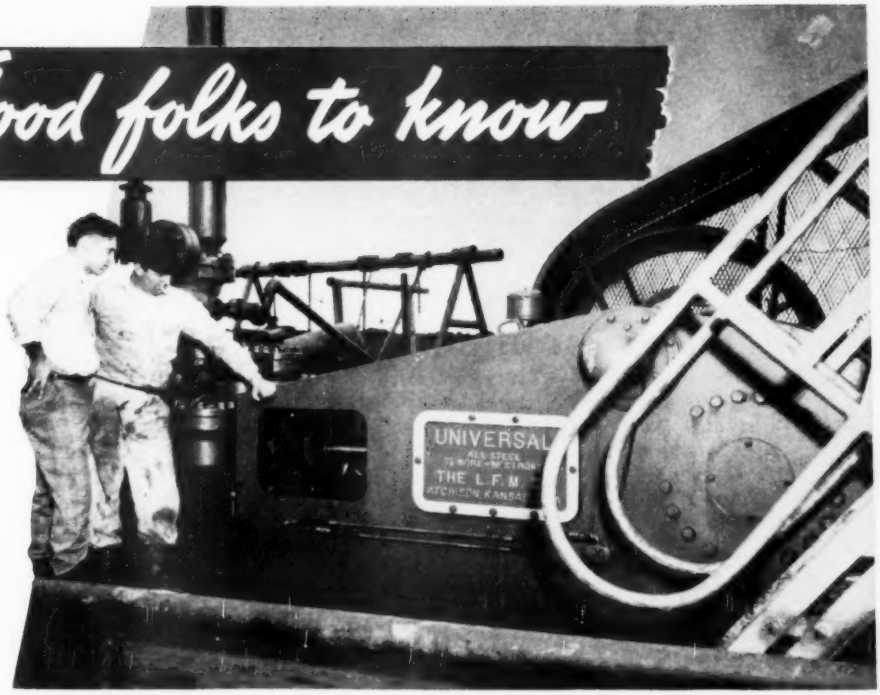
PITTSBURGH PLATE GLASS COMPANY
Industrial Paint Division, Pittsburgh, Pa.
Factories: Milwaukee, Wis.; Newark, N. J.; Springdale, Pa.; Houston, Texas; Los Angeles, Calif.; Portland, Ore. Ditzler Color Division, Detroit, Mich. The Thresher Paint & Varnish Co., Dayton, Ohio. Forbes Finishes Division, Cleveland, Ohio. M. B. Suydam Division, Pittsburgh, Pa.

PITTSBURGH *Industrial* **FINISHES**

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

Good folks to know



Universal

"Talk about pumpin'! . . . It really throws that fluid," was the driller's frank comment on this Universal 7¼" x 16" Slush Pump. He went on to say, "Besides being a good pump, what I like about it is the fact that if we wash out an end, we can weld it up and be back in service in a fraction of the time it takes to get a new part for one of those cast-iron babies."

Universal drilling equipment includes: Rotary Table, Crown and Traveling Blocks, Swivel and Slush Pump. Universal products are stronger, more compact; will require less maintenance; will deliver more service, dollar for dollar. United handles the complete Universal line. United men will be glad to tell you about this outstanding drilling equipment, so get acquainted with them. United folks are good folks to know.

Courtesy
Service
Dependability

UNITED SUPPLY
AND *Manufacturing* COMPANY
TULSA, OKLAHOMA
Stores in Kansas, Oklahoma, Texas, Louisiana, and New Mexico

Uncle Sandy
THE UNITED SUPPLY MAN

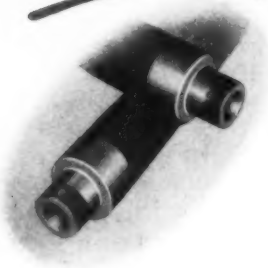
REPUBLIC CHAMPION

ROTARY DRILLING HOSE

HAS 4 SPECIAL ADVANTAGES

1. **Internal anti-shock design gives Republic hose longer life under excessive high and pulsating pressures.**
2. **Flexible over-all construction makes hose handle easier and hang freely in the derrick.**
3. **Built-in steel muscles hold original shape — and protect hose against distortion.**
4. **Oil-resistant Reprene inside and out.**

Plus



No bolts, flanges or protrusions of any kind to catch on the rigging! The patented Boltless coupling used in all Republic Rotary Hose is a lightweight, compactly designed unit streamlined to the shape of the hose.

PATENTED BOLTLESS COUPLING

● Flush-fitting, streamlined couplings are built into all Champion Rotary Drilling Hose. They will not leak or work loose during the life of the hose, and the integral construction plus end reinforcement prevent hose breakage behind the coupling.

The coupling is firmly imbedded in the hose carcass and locked permanently in position. This leak-proof union is protected against the abrasive action of flowing mud by a specially designed hydraulic gasket which tightens the seal when the pressure increases . . . the higher the pressure, the tighter the seal.

Every length of Republic Rotary Drilling Hose is rigidly tested prior to shipment. Type C Hose is designed to withstand pressures up to 5000 psi., Type B up to 4000 psi., and Type A up to 3000 psi. Available in standard lengths up to 55'. See your Republic Distributor today or write direct for further information.

Pioneers in the use of COLD RUBBER

REPUBLIC RUBBER DIVISION
LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN, OHIO
Lee Deluxe Tires & Tubes - - - Conshohocken, Pa.

MECHANICAL RUBBER GOODS BY
REPUBLIC RUBBER DIVISION

YOUR MAGCOBAR DEALER *"Waits Up"* EVERY NIGHT

Just "around the corner" from your drilling location . . . in practically every oil active area of the United States . . . a Magcobar Dealer is ready to serve you. The friendly glow of the light that burns all night long every night in his store window tells you that friendly, efficient mud service is available on call.

The men in these stores have become an increasingly important part of the drilling operation . . . a vital link in Magcobar's Canada-to-Gulf-Coast chain of service. They are ready, day or night, with large stocks of muds and chemicals to help you meet the emergencies of lost circulation, salt water flows, gas blowouts and many other troubles.

The next time you need mud . . . whether it is a routine order or a midnight emergency . . . look for the dealer who sells Magcobar. More than 250 Magcobar Dealers, located with respect to drilling activity, "wait up" twenty-four hours a day to handle your mud requirements promptly at fair and reasonable prices.

MAGNET COVE BARIUM CORPORATION

MALVERN, ARKANSAS — HOUSTON, TEXAS

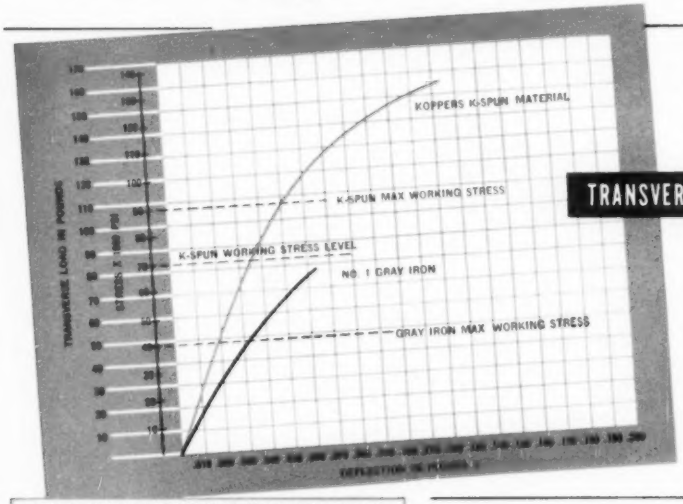
Export:
Daniels, Beckley and Associates
30 Rockefeller Plaza — New York, N. Y.

LOOK FOR THIS SIGN WHEN YOU NEED MUD

MAGCOBAR • MAGCOGEL • HIGH YIELD DRILLING MUD • XACT CLAY • FIBER-SEAL • MAGCO-MICA • TANNATHIN • JEL-OIL MUD • JEL-OIL "E" • SALT GEL • NOHEEV • SEAL FLAKES • MY-LO-JEL • CHEMICALS

Magcobar
Complete
DRILLING MUD SERVICE
DEALER

Here's PROOF that Koppers K-Spun Piston Rings are TWICE AS STRONG!


KOPPERS K-SPUN MATERIAL
K-SPUN MAX WORKING STRESS
K-SPUN WORKING STRESS LEVEL
NO. 1 GRAY IRON
GRAY IRON MAX WORKING STRESS
TRANSVERSE LOAD IN POUNDS

HERE ARE THE AMAZING RESULTS OF ACTUAL LABORATORY TESTS COMPARING ORDINARY GRAY IRON WITH KOPPERS K-SPUN, *THE MIRACLE METAL!*

TRANSVERSE STRESS CHART

Koppers K-Spun material shows a maximum working stress of 90,000 psi, compared with a maximum working stress of *only 40,000 psi for ordinary gray iron piston ring material!* Note the difference in the slopes of the two curves, due to K-Spun's increased modulus. K-Spun's yield point, though approaching ultimate strength, is low enough to allow a small percentage of elongation, resulting in toughness and impact value *many times greater* than that of ordinary gray iron.

TABLE 1—TRANSVERSE MODULUS AND RUPTURE STRESS

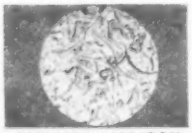
Koppers K-Spun Material			No. 1 Gray Iron		
TRANSVERSE MODULUS at			TRANSVERSE MODULUS at		
40,000 ± psi	60,000 ± psi	90,000 ± psi	40,000 ± psi	60,000 ± psi	90,000 ± psi
22.0×10^6	20.6×10^6	18.6×10^6	12.4×10^6	10.9×10^6	....
RUPTURE STRESS psi			RUPTURE STRESS psi		
130,000			67,000		

TABLE 2—HARDNESS, IMPACT AND TENSILE STRENGTH

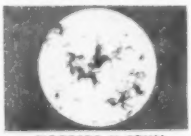
Koppers K-Spun Material			No. 1 Gray Iron		
Hardness Rb	Impact in lbs.	Tensile Stren., psi	Hardness Rb	Impact in lbs.	Tensile Stren., psi
100-103	9.5- 9.5	75,400	102-104	2.5-3.0	42,000
99-100	11.0-11.5	72,500	103-104	2.5-3.0	40,000
105-106	7.0- 5.0	76,000	101-103	3.0-3.0	31,990
99-102	7.0- 8.0	79,100	103-105	2.5-3.0	42,000
98-100	8.5-10.0	76,500	104-105	3.0-3.0	42,300
103-104	6.0- 7.0	77,500	102-103	3.5-3.5	38,000
101-102	7.0- 8.5	78,000	104-105	2.5-2.5	40,000

IF you've had experience with Koppers American Hammered Rings in Diesel, steam or gasoline engines, you already have *proof of performance* of their superiority . . . now read for yourself these scientific facts and figures, verified by exhaustive laboratory tests . . . *positive proof that K-Spun Rings are 100% stronger, 50% more elastic, four times more shock resistant than ordinary ring material!* They're *guaranteed* not to break in installation or in service! Get the facts on Koppers Piston Rings today . . . write for complete information to: KOPPERS CO., INC., *Piston Ring Dept.*, 1554 Hamburg Street, Baltimore 3, Maryland.

K-SPUN IS AN ENTIRELY NEW, STRONGER KIND OF CAST IRON



ORDINARY CAST IRON



KOPPERS K-SPUN

These microstructures, magnified 250 times, show the basic difference between ordinary cast iron and Koppers K-Spun. Top photo shows individually cast gray iron, containing spiral flake graphite with long stringers in a fine pearlitic matrix. This fine flake graphite imparts to the metal many planes of weakness, causing low resistance to combustion shock.

Bottom photo shows K-Spun, cast by an exclusive centrifugal process. Note large nodular type of graphite formation and absence of stringers. Large graphite nodules eliminate the many planes of weakness inherent in most cast iron . . . double impact resistance and elasticity . . . increases wear resistance by far . . . in amazing Koppers K-Spun Piston Rings!

POROUS CHROME PISTON RINGS

. . . another Koppers Exclusive!

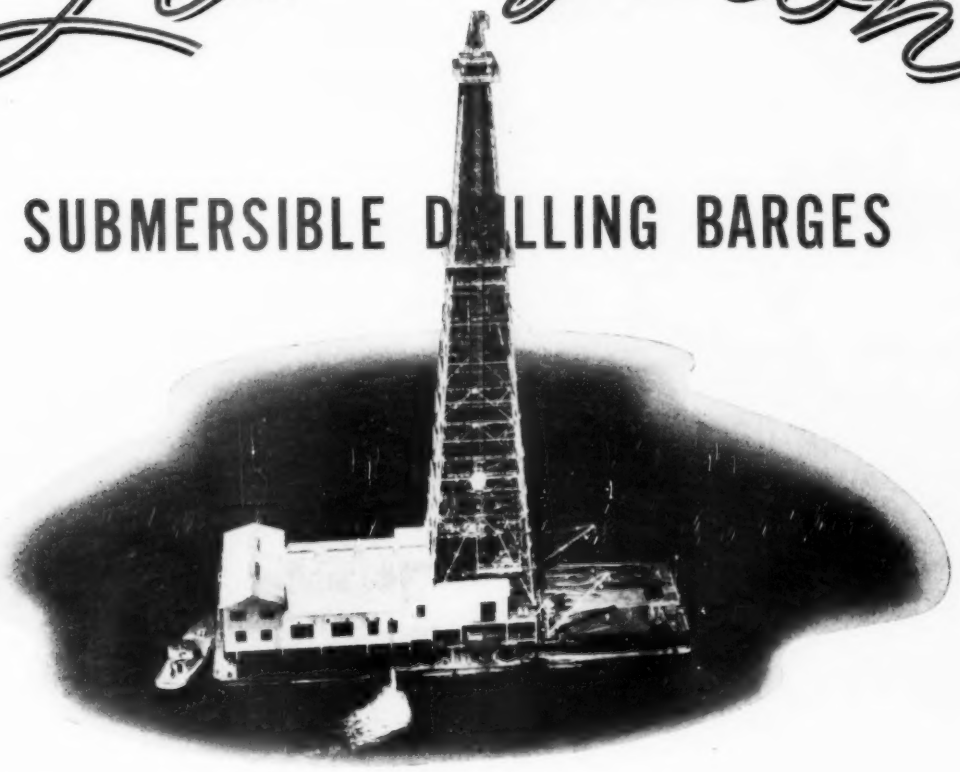
Koppers Porous Chrome Rings reduce cylinder wall wear 50% or more by actual test! Famous Van der Horst Plating Process provides a porous chrome surface that distributes oil for better lubrication during break-in, wears down to perfectly seated solid chrome that gives up to four times as much service between overhauls! For gasoline and Diesel engines (on specification).

KOPPERS

KOPPERS *American Hammered* PISTON RINGS

Levingston

SUBMERSIBLE DRILLING BARGES



Lump sum price (turn-key job) gladly quoted for any size and type of drilling barge, using the owner's old drilling equipment or new drilling equipment of the owner's choice.

LEVINGSTON BUILDS FINE SPECIALIZED MARINE EQUIPMENT FOR THE PETROLEUM INDUSTRY

Non-self propelled oil well drilling tenders—converted LST's

Drilling barges converted from navy seagoing barges.

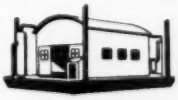
Self-propelled oil well drilling tenders—converted LST's

Boiler barges

Vessels for geophysical exploration

Crew boats

Power barges



Compressor barges

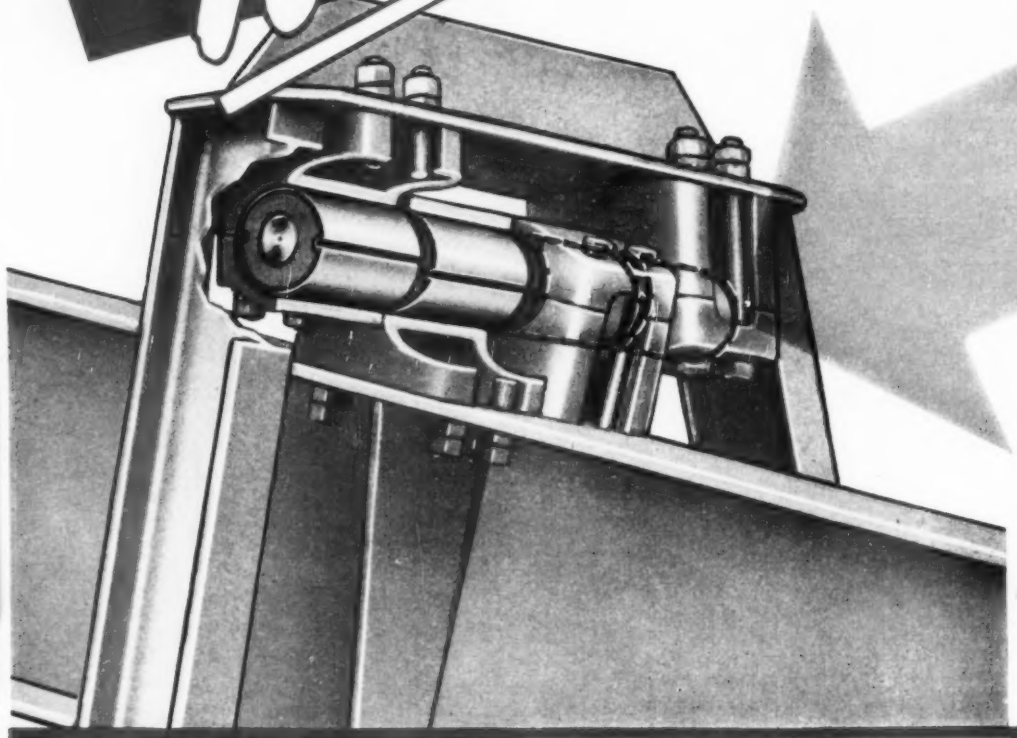
Water, oil and supply barges

Levingston

SHIPBUILDING COMPANY • ORANGE, TEXAS

Tugs

The New CABOT



Cabot Equalastic Bearing Tested Thoroughly and Completely

In 1946 Cabot Shops, Inc. and the United States Rubber Company began work jointly on the Equalastic Evener Bearing. After much research and testing, several bearings were made and installed on units actually operating in the field, and on a laboratory testing machine. (See illustration). This machine, operating at three times normal pumping unit speed in an extremely unbalanced condition, practically broke itself up but failed to damage the Equalastic Bearing! Likewise, field reports not only showed that the Equalastic Bearing passed every test with flying colors but also reduced wear and maintenance on the other components of the pumping unit.

Equalastic Bearing Cuts Production Costs

LOOK at these advantages

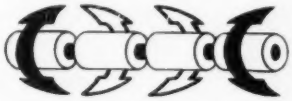
- ★ No Moving Parts
- ★ No Rubbing Surfaces
- ★ No Lubrication Required
- ★ 62 Parts Eliminated
- ★ Absorbs Vibration
- ★ Unaffected by Salt, Grit or Grease

Substitutes torsion within rubber bushings for conventional bearings. It is that simple!

Dynagraph tests prove that maximum polish rod load is reduced.

Here's How it Works

The revolutionary new Cabot Equalastic Evener Bearing (patented) consists of four special rubber cylinders vulcanized on a shaft. Each cylinder has a thin split metal shell vulcanized to the exterior surface.



As shown in the diagram the two outside rubber bearings are clamped to the pitman in large steel castings. The two inside bearings are secured in the same manner to the beam.

All angular motion between the pitman and the beam is taken within these rubber bearings.

This simple but extremely effective rubber bearing eliminates 62 parts, provides a shock absorber between polish rod and prime mover, requires absolutely no lubrication and is resistant to salt water, grease and grit.

Now, after thorough and complete testing, this Equalastic Evener Bearing is ready to go to work saving production money for you in every size Cabot Unit. Check with your nearest Jones & Laughlin Supply Store or write Tulsa for complete details. Do it today.

JONES & LAUGHLIN SUPPLY COMPANY

Subsidiary of Jones & Laughlin Steel Corporation

Tulsa, Oklahoma

J&L STEEL

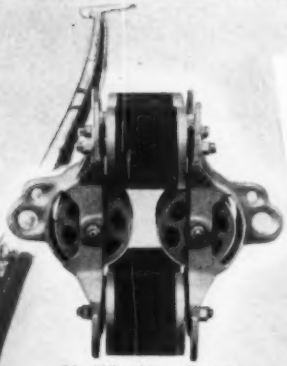
Jones & Laughlin Supply Company Export Office: 230 Park Avenue, New York 17, N. Y.

Always *Specify* Thermoid as your first choice

The top quality of Powerflex Rotary Hose—everywhere recognized as first choice—is typical of the *entire family* of Thermoid Oil Field Products.

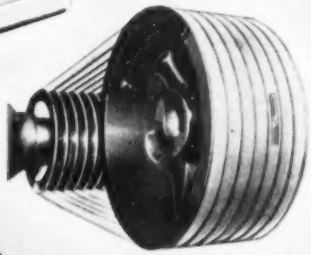
You won't go wrong when you specify Thermoid Quality Products. They are "built for the job", assuring you of dependability under all drilling conditions.

For long service life and low operating cost, it will pay you to *Specify* Thermoid!



No-Wip Line Saver
Beats the danger and expense of excessive line wear.

Wire Line Turn Backs
Spooling troubles become a thing of the past.

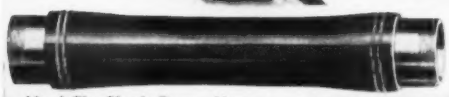


Multiple V-Belts
Specially impregnated to assure longer life under roughest operating conditions.

Flexible Discharge Units
Built to same rugged specifications as Powerflex Rotary Hose.

Blowout Preventer Hose
Can handle any pressure met in blowout preventer equipment. Special high pressure couplings.

First Choice
Thermoid Powerflex Rotary Hose
The recognized leader in the field. Every length pre-tested to 5000 psi before shipment.



Mud-Flo Slush Pump Hose
Tube and cover resist abrasion and oil—steel wire reinforced.

Thermoid Quality Oil Field Products: Oil Country Flat Beltings • Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Powerflex Rotary Hose • Mud-Flo Slush Pump Hose • Flexible Discharge Units • Brake Blocks • F.H.P. and Multiple V-Belts.

SEE OUR CATALOG IN THE COMPOSITE CATALOG

Thermoid Company

Western Offices and Factory • Nephi, Utah, U.S.A.
Main Offices and Factory • Trenton, N. J., U. S. A.
Industrial Rubber Products • Friction Materials • Oil Field Products

used the world over . . .

● *Wherever men seek liquid gold, you will find drillers using Wyo-Jel, the ideal drilling mud material.*

America leads the world in use of Wyo-Jel, but orders reach us from all parts of the world—South America, Middle East, Arabia, Iran, Mexico and Canada, and all of the other oil drilling centers.

Wherever Wyo-Jel is used . . . east, west, north or south . . . it is guaranteed to run uniform and to yield a minimum of 100 bbls. of mud per ton, at 15 Centipoise Viscosity, with very low water loss.

Among drillers the world over, Wyo-Jel is known as the Ideal Drilling Mud Material. They like its fine particle size, the excellent suspending qualities and ease of mixing.

Use Wyo-Jel, the pure Wyoming Bentonite, for reducing your drilling costs, increasing drilling efficiency and lengthening life of drilling mud.

Order Wyo-Jel from your distributor or dealer. Ask us for the folder showing the Rotary Mud Tests.

Dealers Attention: *If you do not stock Wyo-Jel, we invite you to do so.*

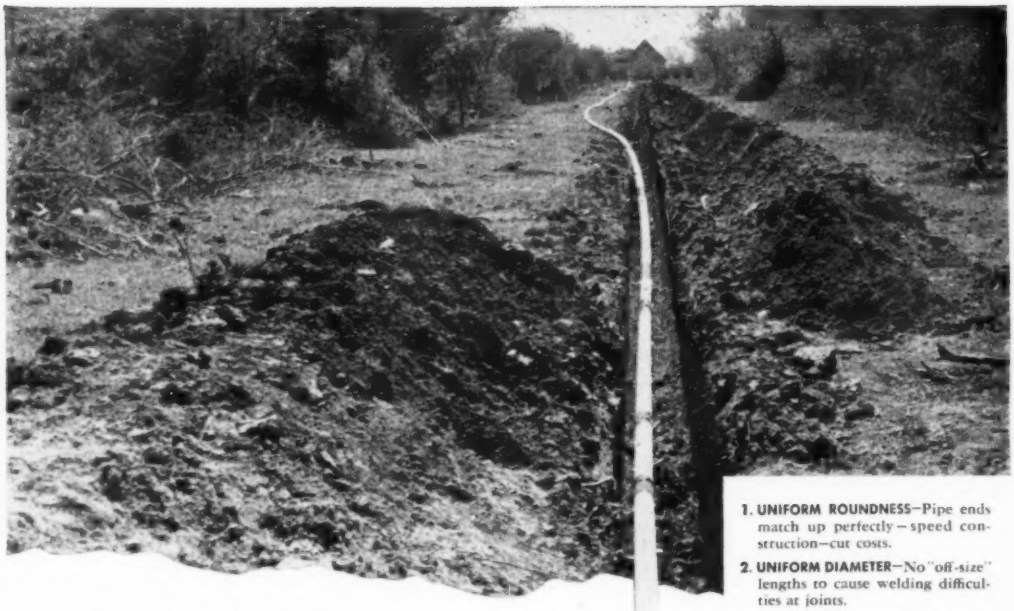
THE WYODAK CHEMICAL DIVISION
of THE FEDERAL FOUNDRY SUPPLY COMPANY
4600 East 71st St., Cleveland 5, Ohio

THE WYODAK CHEMICAL DIVISION
4599 Pacific Blvd., Los Angeles (Vernon), Calif.

EXPORT REPRESENTATIVE
HOLLAND W. SMITH, 43 E. 43rd St., New York 17, N. Y.

The Ideal Drilling Mud Material

WYO-JEL



MOVING FREELY TOWARD FREEPORT...

Another Republic Electric Weld Pipe Line – Over 80 Miles Long

Straight, long lengths go into the ditch freely, moving jobs with greater strides . . . high ductility steel makes field bending easy and sure . . . uniform roundness, diameter and wall thickness make pipe ends match perfectly for fast welding. These are some of the reasons why this 41/2" Republic Electric Weld Pipe Line moved freely through Waller County on its way to Freeport, Texas.

Check all ten field-proved qualities listed at right. They are the real reasons why more than 55,000 miles of Republic Electric Weld Line Pipe has been placed in service over the past twenty-one years – the reasons why this advanced line pipe today provides dependable, trouble-free transportation for crudes, gasoline, natural gas and by-products.

1. **UNIFORM ROUNDNESS**—Pipe ends match up perfectly—speed construction—cut costs.
2. **UNIFORM DIAMETER**—No "off-size" lengths to cause welding difficulties at joints.
3. **UNIFORM WALL THICKNESS**—Absolute dependability throughout every inch of length and circumference.
4. **UNIFORM HIGH YIELD STRENGTH**—Permits building of higher pressure lines—utilizing design values to fullest advantage.
5. **UNIFORMLY STRAIGHT**—Lengths line up evenly—go into the ditch freely.
6. **EASY TO BEND**—High-ductility steel makes bending in the field easy.
7. **EASY TO WELD**—Low carbon steel welds readily—makes sound joints.
8. **FREEDOM FROM SCALE**—Insures against clogged valves, contamination of petroleum products.
9. **LONG LENGTHS**—Reduces number of joints—makes jobs move with longer strides.
10. **INSPECTED INSIDE AND OUT**—Republic Electric Weld Line Pipe is made from flat-rolled steel both sides of which are closely inspected. Thus, you are assured that the surface which becomes the inside wall when formed into pipe is free from hidden defects.

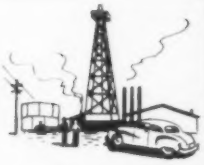
Write for descriptive literature.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Dept.: Chrysler Bldg., New York 17, N.Y.

Republic
REPUBLIC STEEL
ELECTRIC WELD LINE PIPE

Other Republic Products include Casing and Tubing—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

LOOK FOR G-E 2-WAY RADIO



— in the Oil Fields
. . . with drillers, producers, pipeliners

— in Heavy Construction
. . . on dams, dredging jobs, highway construction

— in Logging
. . . for money-saving efficiency, close fire control

— in Taxi Fleets
. . . for faster service, more fares

— in Public Service Vehicles
. . . for powerline construction, emergency repairs

— in Police & Fire Departments
. . . for community safety

— and wherever instant communication is vital or delay expensive!

ADJACENT CHANNEL OPERATION

LOWEST COST — PEAK PERFORMANCE

2-Way Radio

$395.00

NOW GET ALL 3 in the NEW G-E SINGLE-UNIT 10-watt mobile combination

SLASHES

- Initial cost as much as 12%
- Tube costs as much as 30%
- Transmit battery drain up to 33%
- Standby battery drain up to 30%

In lower first cost—lower maintenance cost — less space, this G-E *service-proved* mobile combination offers you more practical advantages than any other single unit on the market . . .

- **. . . BECAUSE it uses fewer tubes. You'll save as much as $11 per set in replacement costs alone . . .**
- **. . . BECAUSE standby battery drain is less than 9 amperes—transmit drain under 20 amperes . . .**
- **. . . BECAUSE it can be tuned in the field with standard tools and meter . . .**
- **. . . BECAUSE adjustable IF gain control compensates for aging of tubes and extends usable tube life . . .**

And that's not all! *Only* General Electric—no other manufacturer—now gives you these features: triple-tuned transformers for extra high selectivity, peak audio output of 2 watts, adjustable IF gain control, and built-in low pass harmonic filter that reduces interference to other services, including television.

Turn the page and study the comparison chart of G-E features against competition. Next time you sign a check for communication equipment, ask yourself this question: Am I getting the best 2-way radio—per dollar of investment—that is available to me?

You can put your confidence in . . .

GENERAL ELECTRIC

YOU BE THE JUDGE — HERE ARE THE FACTS

	GENERAL ELECTRIC 10 WATT UNIT	Manufacturer A	Manufacturer B	Manufacturer C
Triple-Tuned Transformers (high selectivity with fewer tubes)	Yes	No	No	No
2 Watts Peak Audio Output	Yes	No	No	No
Full Range, 148-174 mc in one model	Yes	No	No	Yes
Instantaneous Modulation Limiting	Yes	Yes	No	No
All Tuned Circuits accessible from top of chassis	Yes	No	No	Yes
Adjacent Channel Selectivity	Yes	Yes	Yes	No
Synchronous Vibrator Power Supplies (no rectifier tubes required)	Yes	No	No	YES
Adjustable IF Gain Control (prolongs tube life)	Yes	No	No	No

	GENERAL ELECTRIC 10 WATT UNIT	Manufacturer A	Manufacturer B	Manufacturer C
Number of Tubes	22	26	27	22
Cost per Set of Tubes	$32.77	$43.58	$37.46	$38.99
Less than 9 amps standby battery drain @ 6.3v	Yes	No	No	Yes
Less than 20 amps transmit battery drain @ 6.3v	Yes	No	No	No
Spurious Radiation at any frequency	70 db	60 db in the band only	60 db	60 db
Cable Junction Box	Not Required	Required	Not Required	Not Required
Key Lock for Protection of Every Unit	Yes	Optional at Extra Cost	Not Available	Not Available
Microphone Quick Release Plug	Yes	Not Available	Not Available	Yes
Built-In Low Pass Harmonic Filter	Yes	No	No	No
At Least 95 db Attenuation of Spurious Receiver Response	Yes	Yes	No	No

MAIL THIS COUPON TODAY !

General Electric Company, Section AA-1
Electronics Park—Syracuse, New York

I want to know more about the new G-E low-cost radio communication equipment. Send me complete details.

NAME_____

TITLE_____

ADDRESS_____

CITY_____ STATE_____

You can put your confidence in...

GENERAL ELECTRIC

X55-024

Printed in U.S.A.

THIS IS THE FIRST IN THE 1950 series of Standard Oil interpretive advertisements, telling the story of the company's operations in terms of its people—and, incidentally, telling a good deal about how advertising and selling affect the operation of the American economic system.

WAYNE KING, "THE WALTZ KING," is one of America's most popular entertainers. He is also one of Standard Oil's best salesmen—and one of the reasons why our employees' jobs are stable and well-paid. His weekly Standard Oil television show is a delight to see and hear.

SWEET MUSIC AND MORE JOBS BOTH COME FROM THIS HORN

What happens when Wayne King sells you on trying a tankful of WHITE CROWN Gasoline?

All down the line, there's work for people to do. The service station man puts the gasoline in your tank. The Standard Oil tank truck driver brings the station more gasoline, to replace what you bought. Our refinery men send more gasoline to the truck driver's bulk plant. The pipeline man pumps more crude oil to the refinery. The driller brings more oil to the surface.

Working as an integrated team, the 46,700 employees of Standard Oil and its subsidiary companies are able to make more petroleum products, make them better and make them more readily available to you, than would otherwise be possible.

The more we sell, the more people we need to make more products. Our present employees become more secure in their jobs, and new jobs open up.

Good products *plus* good salesmanship are an unbeatable combination that helps make our country great and the American standard of living the highest in the world. *Everyone has a chance to earn more by producing more.*

STANDARD OIL COMPANY (INDIANA)

ARCHIE DAILEY is a member of one of our drilling crews. Our cost of finding crude oil has gone up 389 per cent in the last ten years. Yet, because of the steady progress of the petroleum industry, you now pay only 45 per cent more for gasoline than you paid in 1940.

W. F. MICHAEL works at our Drumright, Oklahoma, pipeline pumping station. He helps keep crude oil flowing from the wells to our refineries, along a Standard Oil network to which many miles of new pipelines were added in 1949.

CHARLES QUINN is a catalytic cracker stillman at Standard Oil's Sugar Creek, Missouri, refinery. Like each of our 46,700 employees, he is backed by a big investment in tools and equipment. This was made possible by the investment of the 96,800 owners of Standard Oil.

MILO D. LARSON, agent, runs our Highland Park, Illinois, bulk plant. He delivers the finished products of our refineries to farms, to industry and to the independent service stations where they are sold to you and millions of other Standard Oil customers.

Sure in all weather

Santa Fe freight service

Your freight moves by the clock—not by the weather—when you ship via Santa Fe.

Modern all-weather dispatching methods speed freight through terminals and a powerful fleet of diesel locomotives keep traffic rolling along the line to give dependable on-time arrival at destination.

Even Santa Fe's main freight routes are favored by nature for all-weather operations as these routes are without extreme changes in temperature or climate.

It pays to ship Santa Fe—*the dependable all-weather-way.* For information call your nearest Santa Fe freight representative.

F. H. Rockwell, *General Freight Traffic Mgr.*
Santa Fe System Lines, Chicago 4, Illinois

Santa Fe—all the way

Santa Fe

They Say—

Pumping Suggestion

Sir:

We have some oil wells producing from the Trenton formation about 300 ft. deep. The wells are small, producing only a few barrels of paraffine-base crude.

Some say that we should set the pump up so that the sand will always be covered with oil. Others say it is better to set the pump on bottom so that the wells will pump dry.

I would be glad to have your opinion on whether the pump should be set up so the sand will be kept covered. Could you give us some instructions as to how the pump should be set.

R. L. Pattinson,
Medina Natural Gas Co., Ltd.,
Alymer, Ont., Canada.

Editor's note: There are some opposing factors to this situation, probably the best solution being to see which procedure obtains the best production.

If the pumps are set very low, after the wells have been "pumped off' the sand face will be indirectly exposed to oxygen and a certain amount of solid accumulations may be built up on the sand face.

On the other hand, if the pumps are set high so the sand will always be covered with oil, the back pressure created by the head of oil in the hole will oppose the crude-oil flow into the well bore.

There is still another alternative. Many stripper operators have found some production advantage in installing small pumps and operating them continuously on a short-stroke, slow-pumping cycle. This method provides a lower average back pressure or "oil head" in the well bore, yet still keeps the sand face covered with oil.

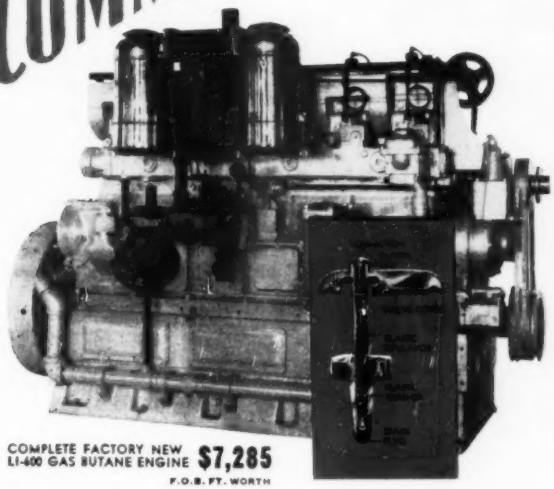
Pipe Specifications

Sir:

Several members of the A.P.I. committee on standardization of oil country tubular goods have called our attention to errors which appear in the article on specifications of pipe for refinery service. *(Specification of Pipe for Refinery Service, by O. L. Lewis, March 9, page 97.)*

For instance, in paragraph 3 on page 98 the statement is made "the A.P.I. 5L specification is comparable to A.S.T.M. A-53 except that bessemer steel is not acceptable." This is not correct because our Std. 5L does cover killed, deoxidized, acid bessemer steel. In the same paragraph,

Now Available—
CUMMINS NATURAL GAS-BUTANE LI-600 ENGINES



COMPLETE FACTORY NEW LI-400 GAS BUTANE ENGINE **$7,285**
F.O.B. FT. WORTH

Simplicity is the keynote of the new "Spark plug adapter" which permits easy installation of plugs for use of Natural Gas or Butane fuel.

The advanced and improved design of the fuel system used in the Cummins LI-600 Natural Gas-Butane engine guarantees smooth, efficient and economical operation, along with the dependability for which Cummins engines are world-famous.

SERVICE: Cummins engines are designed for simple and inexpensive servicing. Each element of the engine is made into an individual unit that can be removed — as a unit — for service. This includes upper rocker arms, lower rocker arms, cylinder heads, removable liners, precision type bearings and the overhead valves. Large hand hole plates are removed to permit accessibility to the connecting rods and main bearings, which can be lifted out without taking the engine from the crankcase or the base-type oil pan.

COOLING: Ample cooling is provided by use of "Tropical Cores" in the radiators which were designed for Diesel operation. These radiators are extremely heavy in construction and include cast iron tanks with steel side members with removable radiator section. Cleaning the cores is simple due to removability and the cast iron headers.

LUBRICATION: The engine is completely lubricated by pressure from an oil pump mounted on the front gear case. It can be removed quickly and easily for service. Full pressure lubrication assures an ample supply of oil to all working parts under all variations of speed and load.

SPECIFICATIONS: The six-cylinder engine has a 7" bore and 10" stroke. Crankshaft is 5½" in diameter and is mounted in copper lead bearings. Engine was designed for compression pressure of 500 lbs. to the square inch when operating on Diesel fuel. This is an important factor in longer engine life when natural gas-butane is used since the pressure under these circumstances is lowered to 120 lbs. per square inch. Rollers are used on all upper and lower cam rocker levers. Weight of the engine is 10,400 pounds with radiator but less PTO.

This new natural gas-butane type engine is a development of Cummins Sales & Service, Inc., Fort Worth, Texas.

For more information, write us for Bulletins C-200-LG-600

UNIT ASSURES ECONOMY IN FUEL COSTS AND LONGER ENGINE LIFE

Originally constructed for operation on diesel fuel, the Cummins Model LI-600 engine now is available with a new "spark-plug adapter" for use of natural gas or butane fuel.

In addition to making possible the use of the most readily available and economical fuel supply, the new unit also assures greater engine life because of lower compression ratio. When operating on diesel fuel the ratio is 16:1. On natural gas-butane, it is lowered to 6.8:1.

This engine delivers 280 horsepower max. when burning 1,000 BTU butane or 78 octane gas.

CUMMINS SALES & SERVICE, INC.

GENERAL OFFICES FORT WORTH, TEXAS

THE LARGEST DISTRIBUTOR OF CUMMINS DIESELS IN THE WORLD!

CUMMINS DIESEL POWER

MODERNIZE - ECONOMIZE STANDARDIZE *with* *CUMMINS DIESEL GAS-BUTANE ENGINES*

CAMCO
Gas Lift Valves

THE ONLY VALVE WITH INSURED WELL ACTION

CAMCO-IZING . . . an exclusive Camco process . . . pre-forms the Camco valve bellows with 5,000 lbs. differential pressure, testing and conditioning it for correct, positive action under the most severe well conditions. That's one of the big reasons why hundreds of CAMCO VALVES are installed today under well conditions requiring from 125 thru 1650 psi. The Camco line of gas lift equipment is the most complete offered by any manufacturer. Four general types of CAMCO Valves . . . Pressure Controlled, Differential Flow, Constant Flow and Injection Control . . . provide the widest range from which to choose the right valve for your well. Ask your Camco Representative at Corpus Christi, Alice, Victoria, Beaumont, Lafayette, Shreveport, Houma, Midland, Odessa, Oklahoma City . . . or phone, wire or write CAMCO, INC., 7315 Canal St., Houston, about your well producing problems.

Quick facts about

CAMCO VALVES

Stress-equalized monel spring combined with pressure-charged bellows provides positive valve shut off — also makes field adjustment easy up to 100 psi above or below original setting.

Diamond-hard Tungsten Carbide ball valve minimizes fluid leakage and seat cutting, gives long trouble-free service.

Scientifically designed inlet ports and flow passages provide greater efficiency.

Your copy of the new CAMCO catalog is now ready . . . Write for it today.

CAMCO

GAS LIFT EQUIPMENT AND SERVICE

the statement is made that tests are required only on tensile strength and elongation, whereas the specification requires bend tests and also covers hydrostatic testing.

Edwin Joyce,
American Petroleum Institute,
Division of Production,
Dallas.

Editor's note: The following explanation answering the letter above was prepared by Orval L. Lewis, of Jones & Laughlin Supply Co., author of the article.

"Reference to A.P.I. Specification for Pipe Line, Eleventh Edition, May 1949, covering A.P.I. 5L, indicates that the A.P.I. 5L specification limits material to be used for Grade "A" seamless or electric welded pipe, to the product of the electric furnace or open hearth, acid Bessemer steel being acceptable only in their Grades "B" and "C." Under these classifications where Bessemer steel is acceptable, the allowable manganese content is increased from 0.90 to 1.5 per cent, the allowable phosphorous content from 0.045 to 0.110 per cent. As the subject paper was based primarily upon Grade "A" materials, the acceptability of Bessemer steel in the other two grades was not mentioned.

"Physical tests under the A.P.I. specification cover tensile and hydrostatic for all materials. Flattening tests are included for electric-weld and lap-weld steel pipe within limitations. Bend tests are required only for butt-welded steel pipe 2⅜-in. outside diameter and smaller. As hydrostatic tests are required on all the mill products mentioned in this article, they were not set forth specifically except in the instance where this was the only physical test required. As butt-weld pipe is not normally specified in hydrocarbon service, the bend test where required by A.P.I. is limited to a minor portion of pipe covered by this specification. It was not considered applicable to the material being discussed.

"As it is obviously impossible to cover all details of material specification in a limited article on application of these materials, I wish to thank Mr. Joyce for this opportunity to enlarge upon original statements to this extent, and point out the necessity for reference to applicable detailed specification available from A.P.I and A.S.T.M. for specific mechanical and physical requirements applicable to any particular material."

New Giant

"The increasing importance of natural-gas reserves cannot be overemphasized. The rapidly expanding market for this product in the last 2 years has radically altered the fuel economy of the nation, and the change is of the utmost significance to the oil and gas industry.

"The large-scale invasion of nat-

ural gas into the fuel markets of the East, Middle West, and Pacific Coast has already displaced a considerable volume of other fuels, and the outlook is for a continued increase in this displacement. At the same time, this important change in the fuel economy fully justified an upward reappraisal of the value of natural-gas reserves."

Annual report, Plymouth Oil Co.

Sawyer's Business View

"We should all thank God for American business. What would we face if we did not have it? Either millions of our people would be starving, or our factories would be run by the Government. That odious prospect should make it easier to think clearly on this subject. If the Government ran business what would become of the millions of small shareholders who live on their income from business? And what would take the place of the money they now spend to buy the products which keep our factories going? Who would pay the taxes now paid by business? What would become of the bargaining power of labor? If labor couldn't strike against the Government, what power would it have? If it could strike, what power would the Government have?

Charles Sawyer, Secretary of Commerce, addressing American Association of Advertising Agencies and Association of National Advertisers, White Sulphur Springs, W. Va.

Canada's Prairie Oil

"We can today put a rough figure on the saving in the cost of energy that is already being realized by prairie consumers. In 1949 petroleum products cost prairie consumers some $30 million less than would have been the case had prairie prices been based upon the cost of crude imported from the United States. By far the major part of this saving accrued to consumers in Alberta and Saskatchewan. Manitoba consumers may expect substantial benefits with the completion of the Interprovincial pipe line and the construction of additional refining capacity at Winnipeg.

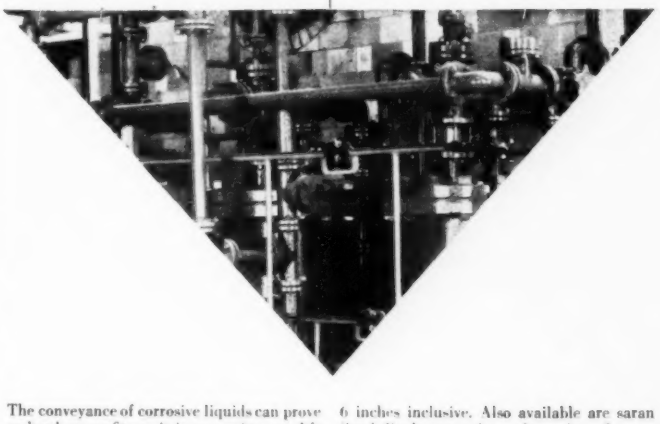
"Looked at from the point of view of the prairies as a whole, the development of Canadian crude to replace imported crude meant a $30 million dividend to the prairie consumer, roughly $12 per capita or a cost per gallon of product some 3½ cents lower than would have been the case if imported crude had been used. . . .

"Perhaps its greatest significance stems from the fact that western crude is still pressing outward, and that further price cuts to the consumer will appear in future."

John R. White, vice president, Imperial Oil, Ltd., addressing University of Western Ontario Business Club, London, Ont.

SARAN LINED steel pipe

cuts repairs and replacements to a minimum!



The conveyance of corrosive liquids can prove as hard on profits as it is on equipment. It's this realization that has compelled more plants than ever before to install corrosion-resistant saran lined steel pipe. Saran's resistance to most chemicals and solvents reduces shutdowns and lost production! Saves time and labor!

Saran lined steel pipe is available in maximum lengths of 10 feet and in sizes from 1 to 6 inches inclusive. Also available are saran lined diaphragm valves, plug valves, flanges, reducing flanges, flanged fittings, gaskets and fittings with union ends.

Write us today for further information concerning saran lined steel pipe and how it may help solve your corrosion problems. Manufactured by The Dow Chemical Company, Bay City, Michigan, distributed by Saran Lined Pipe Company, Dept. TSP-20.

Distributed by

Saran Lined Pipe Company

701 STEPHENSON BUILDING • DETROIT, MICHIGAN

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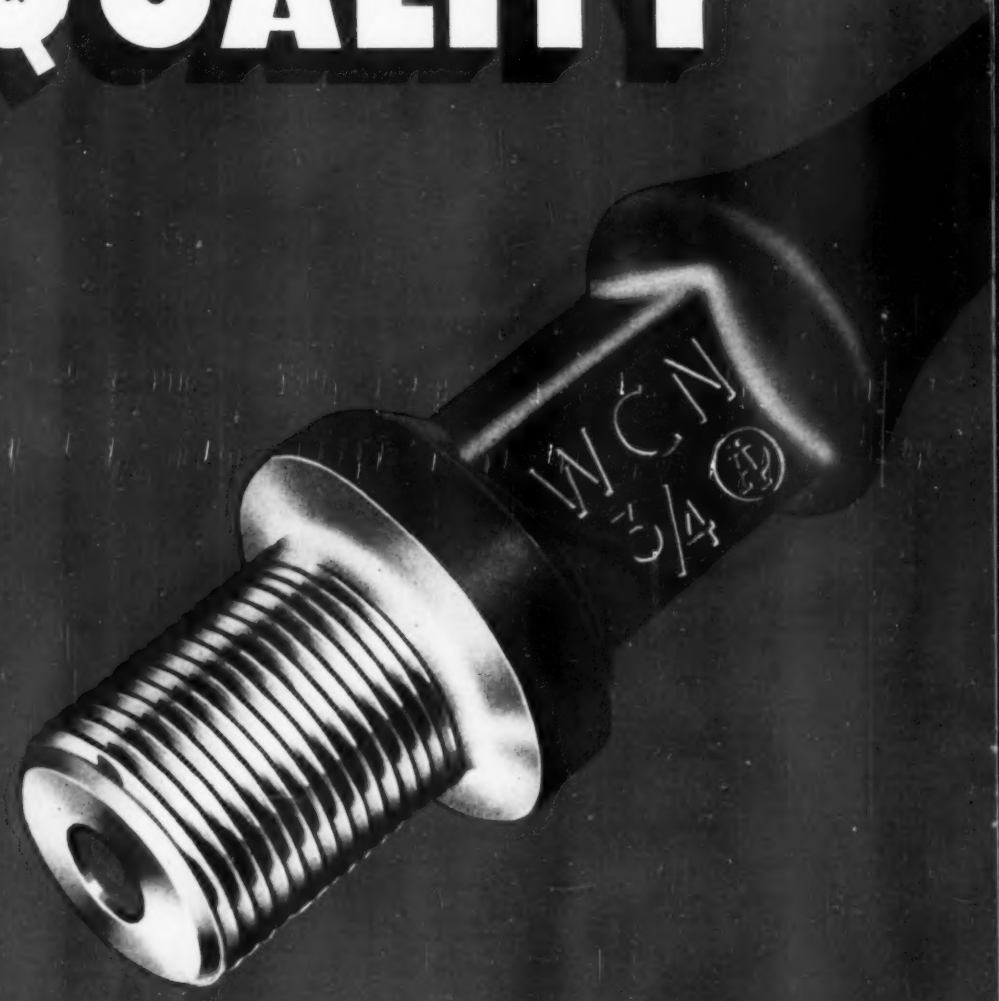
SARAN LINED PIPE a DOW product

THE SUCKER ROD WITH QUALITY



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JOURNALLY Speaking

Flying Saucers

WHAT was described as some reassuring news about flying saucers was given to the Western Petroleum Refiners Association at its San Antonio meeting.

Henry J. Taylor, journalist and world traveler, said the saucers are real, are not hostile, are not from Mars, not from Russia, but are a new type of aircraft, and when our military men decide to remove the wraps of secrecy the facts will be very reassuring.

Taylor may have thought he was reassuring the refiners, but he wasn't. What the refiners really want to know is whether these flying saucers will operate on residual fuel oil or whether they will require a lot of high-octane gasoline. The revelation may benefit the human race, but what about the octane race?

Earth Science

A RECENT crack in this department to the effect that geologists might be a bit slow on the uptake because they are accustomed to thinking in terms of geologic time has drawn a rejoinder from one of the profession.

He cited a paper delivered by a geologist before a meeting of geologists reporting a survey made by geologists which showed that in the 14 years since Hoover Dam was built the Colorado River has deposited more than 2 billion tons of silt on the bottom of Lake Mead.

We aren't clear as to what the survey proves except that the forces of erosion and sedimentation didn't stop 100 million years ago, but to our friend it proved that geologists are right up to date in keeping track of the changes in Mother Earth's complexion.

That latter contention was never doubted. Nor was there any doubt that geologists and oil finders of kindred sciences are right up to date on the latest methods of telling what's what thousands of feet below the surface. As proof of this, several trainloads of them will congregate in Chicago April 24 and spend 3 days exchanging information. And it will all be reported in the April 27 issue of our favorite oil publication, an issue you won't want to miss if you are at all interested in finding oil.

Cybernetics

WE wish we could have gone to Oklahoma A. & M. with the Tulsa section of the American Institute of Electrical Engineers recently and heard a lecture on cybernetics.

Cybernetics, we are given to understand, is the business of building machines that think. There has been quite a bit in the papers about these machines of late. Apparently they can solve mathematical problems that no human mathematician ever had the heart to tackle.

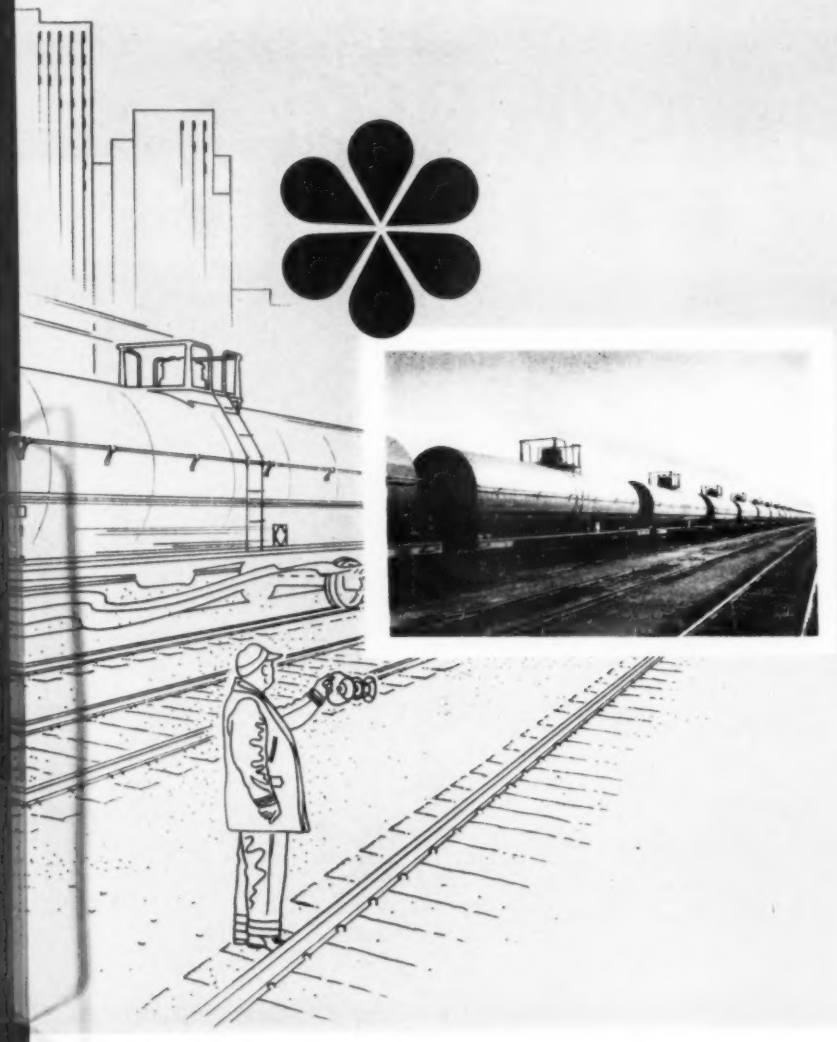
But we think it is unfair that the blessings of cybernetics are confined to the mathematicians. Why can't there be a thinking machine to solve an oil man's problems for him? Or an editor's? For years we have been shopping for a machine which would take a 26-page speech delivered at an oil meeting and digest it into three succinct paragraphs. Even a typewriter that would spell correctly would be a big boon to our business.

Historians Note

FOR the first time in its existence the Mississippi Valley Historical Association is taking official notice of the oil industry at its annual meeting in Oklahoma City April 20-22.

The oil industry has really come of age when historians consider it a fit subject for their delvings. But we trust that this sudden interest is not due to any government-inspired belief that the oil industry's history is all over and that it is ready to be exhumed and displayed in glass cases along with Ninevah and Tyre and Old King Tut.

—*Henry D. Ralph.*



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Anchor is a merchant in petroleum. If you have excess natural or refined products, Anchor will buy them, shouldering all your marketing problems . . . Or, if you need petroleum products, Anchor can supply you promptly, regularly and in quantity. Anchor buys and sells Butane-Propane, natural gasoline, kerosene, diesel oils and fuel oils . . . Anchor's extensive transportation facilities are nation-wide. Branch offices are located in strategic cities. Personnel are friendly and experienced. Whatever your needs in buying or selling, you'll do better if you . . . Call Anchor First.

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The OIL AND GAS JOURNAL

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John C. Reidel ... 211 S. Cheyenne, Tulsa
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Roy F. Carlson ... Mercantile Bank Bldg., Dallas
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In This Issue

News

Several Firms Made Big Production Gains in Texas in 1949 57
I.R.A.A. Proposes Proration of Natural Gas 57
New Tool Devised to Save Earthquake-Damaged Wells 58
Strikes Close Five Major Texaco Refineries 59
Synthetic Benzene Being Produced from Petroleum Commercially 60
Crude-Oil, Product Imports Showed Drop in February 60
Offshore Drilling Problems to Be Studied at Texas A. & M. 61
Sun Begins First Use of Lead in Its Gasoline 62
Penn Grade Representatives Protest ECA-Refinery Program 63
Thorp Says Oil Is Major Factor in Foreign Relations 63
Harris Bill to Create National Petroleum Policy Council Opposed 64
Congressman Proposes New Regulations of Pipe Lines 65
Oklahoma Orders 19 Fields Shut Down 65
Toughest Pipe Line Holds Many Construction Records 66
Cathodic Protection Practices Highlight N.A.C.E. Meeting 68
New Methods for Computing Deviations from Boyles Law in Use 69
British Reply Awaited on Sterling-Dollar Oil Controversy 72
Outlook Uncertain on Proposed Peruvian Petroleum Law 73
Joint Firm to Be Organized to Develop Sinkiang's Oil 73
Arabian American Shifting Purchases to Non-American Areas 73

Engineering-Operating

Socony-Vacuum Revamps Lube-Manufacturing Facilities 78
Subsurface P.T.F. Conditions Recorded on a Single Run 80
Offshore Seismograph Work with a Single Boat 82
Steam Rig Runs 90-Day Test on Water-Tube Boilers 84
Modern Trends in Industrial Water Treatment 92
Water Flooding to Insure Maximum Oil Recovery 101
Book Reviews 108
Progress in Metals 109
The Refiner's Notebook—Application of Automatic Control 115
Engineering Fundamentals—Sources of Reservoir Data 117
Oil and Gas Equipment Digest 119

Exploration-Development

Second Pool for Forest City Basin, Kansas? 141
Highlights of Week's Developments 141
Reports by Areas Start on Page 142

Departments

They Say 46
Journally Speaking 51
Editorial 55
This Week 56
Watching Washington 64
International News 72
Personals 75
Deaths in the Industry 77
Natural-Gas News 124
Natural-Gasoline News 124
Pipe-Line News 127
Drilling Contractors 133
Exploration Statistics 156
Production Statistics 157
Refining Statistics 158
Market Statistics 159
Equipment Men in News 160
Classified Advertising 163
Calendar of Events 166
Advertisers' Index 166

NO OTHER EQUIPMENT—no other method of cementing—provides such assurance of successful "first-time" cementing as the exclusive Baker Principle of *whirling* the cement up and around the casing which is effectively centered in the well with BAKER MODEL "G" CASING CENTRALIZERS.

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You are assured of RESULTS when you use Baker Hook-Ups as pictured at right using a BAKER WASH-DOWN WHIRLER GUIDE SHOE (Product No. 121) with BAKER MODEL "G" CASING CENTRALIZERS spaced throughout the cementing area to provide *maximum centering force at the critical cementing point*. Then, with a BAKER CEMENT FLOAT COLLAR (Product No. 101 M & F) positioned a joint or two above the shoe, you have the world's best "float valve" for safety, plus a "stop" for the cementing plug so that cement tailings are retained inside of the casing.

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Call the nearest Baker representative or office. Find out how dealing at Cementing Headquarters means SUPERIOR RESULTS FOR YOU.

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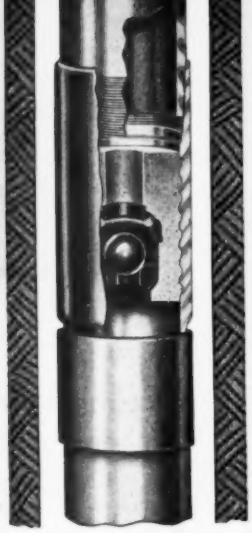
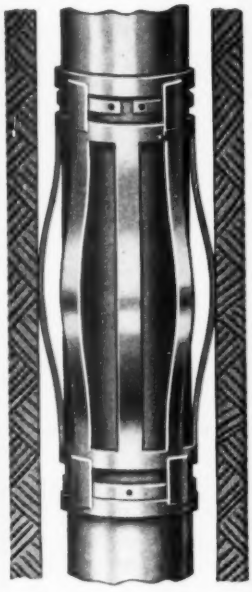
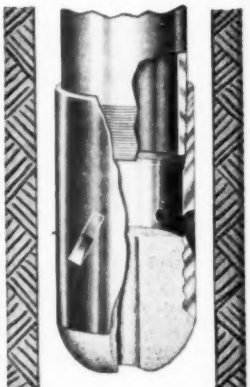


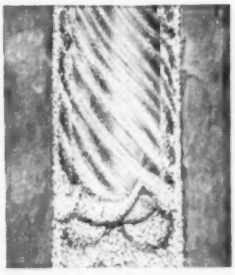




Here is visual proof of what *whirling* does for you...

The downward hydraulicking action of the circulating fluid through the baffled side down-whirler ports and the restricted bottom passageway, effectively remove bridges and permits safe running of the string of casing.

When washing the formation at the cementing point to condition the hole, the "whirling" motion of the fluid helps remove mud cake from side walls. This *downward* whirling is far superior to any *side jetting* action, and does not cause caving or crumbling of soft formations.



The "whirling" motion given to the cement slurry as it is discharged from a Baker Wash-Down Whirler Shoe causes the cement to encase the centered shoe joint with a more uniform body of cement, and reduces to a minimum the hazard of channeling.

A Propaganda Bureau

The U. S. Bureau of Mines, unless it drops some of its postwar policies, bids fair to join those agencies of Government which exist primarily for propaganda purposes and are so recognized.

The bureau was created as a fact-finding organization to serve both the Government and the natural-resource industries, and through them the tax-paying public. The appropriations prewar for oil and gas work were adequate but modest, and for that type of work still are.

There are tangible results to point to. The bureau's economic reports are widely used and there have been worth-while contributions to the petroleum arts and literature.

But these industry-bureau relationships of long standing are now being jeopardized by the determined efforts of Department of Interior and other government officials to develop synthetic substitutes for oil and gas, using shale and coal as raw materials.

Heavy spending, which dwarfs the appropriations made for the customary activities of the bureau's oil and gas division, has taken place in experimental plants. This has been accompanied by a steady stream of reports and releases from the Interior Department, all adding up to claim that the laboratory and pilot-plant work has definitely established that petroleum substitutes can be manufactured commercially. Programs involving expenditures of hundreds of millions and billions of dollars for large-scale operations are requested.

As to the claims, the opening sentences of a release last week is typical. It said: "This country moved appreciably closer to independence of foreign sources of oil last year when the B. of M. opened demonstration plants producing gasoline, diesel fuel, fuel oil, and other petroleum products from coal on a commercial scale, and solved the problem of mining oil shale at a low cost, according to the annual report of James Boyd, director, to Secretary of the Interior Oscar L. Chapman."

Research and developments departments of oil and associated enterprises challenge every major government conclusion as to the commercial feasibility of these synthetic operations. Costs of delivered product of comparable quality would be from 50 to more than 100 per cent greater in the case of shale or coal operations.

False hopes are raised in coal and shale centers and when the citizens of these areas contact with their Washington representatives they are told that progress is being stopped owing to the opposition of oil operators.

From the petroleum standpoint much of this is a matter of official testimony presented at hearings of investigating committees. The record needs to be completed so that there can be no question as to the facts.

Then let there be releases to the public from the oil and gas industry. Operators owe this to a confused public as well as to themselves.

THIS WEEK

ACHIEVEMENTS—Sun Oil Co. now operating world's first quadruple-reactor Houdriflow cracking unit. . . . Claims to lead all companies in catalytic cracking. . . . But will begin using tetraethyl lead for still higher octane rating of gasoline. . . . ¶Pan American begins first commercial production of synthetic benzene from petroleum. . . . ¶Completion of "Toughest Inch" gas pipe line across Appalachians involved many construction problems. . . . ¶California operators devise crooked-hole rig for wells in earthquake area. . . .

ACTIVITY—Crude production for week ended April 8 averaged 4,932,425 bbl. daily, an increase of 123,125 bbl. daily over previous week and 20,500 bbl. daily over same week last year. . . . ¶Well completions totaled 718 for the week, a decrease of 14 wells. . . . Wildcat completions increased 5 wells to 131. . . . ¶On April 3, a total of 2,008 rotary rigs were operating in United States, or 5 rigs fewer than last year. . . .

PRODUCTION—Many Texas producers increased their crude output last year despite state-wide reduction in allowables. . . . Most leading producers held their positions and some smaller ones made spectacular gains. . . . Shows effect of new discoveries on production pattern. . . . ¶Independent refiners ask Texas commission to prorate production of natural gas and gas liquids to restore market for crude and refined products. . . . ¶Oklahoma commission takes step to stop production in excess of monthly allowables. . . .

TRENDS—Daily average refinery production of gasoline for week ended April 1 was greater than average for any of summer months of 1949. . . . ¶Indicated refinery demand for gasoline increased about 60,000 bbl. daily over previous week with most of the gain in Mid-Continent and inland Texas districts. . . . ¶Natural-gasoline prices regained 0.25 cent of the 1.875 cents a gallon lost since the first of February. . . .

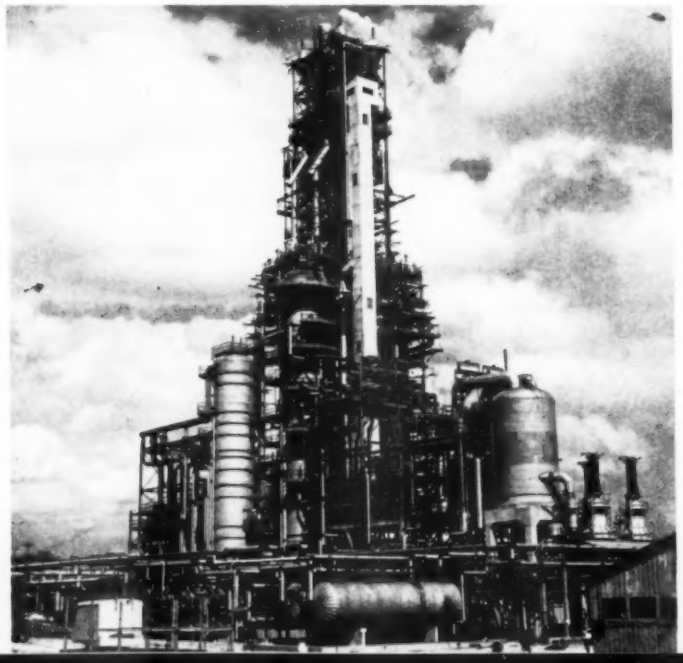
LABOR—Pattern for industry's labor negotiations this year emerging in current refinery strikes. . . . Oil workers seem more interested in security than higher wages. . . . Chief issues are pensions, job classifications, spreading the work in slack times, assurance of jobs for union members. . . .

GOVERNMENT—White House under tremendous pressure pro and con Kerr natural-gas bill, but proponents believe it will become law. . . . President has until April 17 to sign or veto. . . . ¶Existence of Oil and Gas Division seriously threatened by appropriations cut. . . . NPC lining up defense. . . . ¶State Department opposes Harris bill to create interdepartmental petroleum policy body. . . . ¶Congressional action on tidelands ownership may come this summer. . . .

FOREIGN TRADE—Imports of crude and products dropped sharply in February to 689,000 bbl. daily. . . . Still considerably over last year. . . . ¶State Department official insists domestic industry not seriously injured by oil imports. . . . Tells Congress national interest in foreign oil transcends the problems of specific segments of the industry. . . . ¶Penn Grade spokesmen protest to Congress over ECA financing of European refineries. . . . Predict exportable surplus of lube oils will destroy historic world markets for U. S. high-grade lubricants. . . .

NATURAL GAS—Short-cut methods introduced for computing deviation from ideal gas laws in metering natural gas under pressure. . . . Complies with Texas and Louisiana laws. . . . ¶Bill in Congress would make natural-gas pipe lines common carriers and prevent them from transmitting their own gas. . . . ¶New methods of sampling natural gas and measurement of water-vapor content of fuel gases completed by A.S.T.M.'s Committee D-3 on Gaseous Fuels. . . . ¶FPC approves 200-mile natural-gas line proposed by Commonwealth Natural Gas Corp. in Virginia. . . .

PIPE LINES—New developments in combating corrosion presented at N.A.C.E. meeting. . . . ¶Great Lakes Pipe Line Co. will accept 1,000,000 bbl. additional of petroleum products through its system this month. . . .



SKY SCRAPER.—Tallest refinery structure in the world, is the claim Sun Oil Co. makes for this quadruple-reactor Houdriflow catalytic cracking unit just completed at its Toledo refinery. It towers 308 ft., which is longer than a 100-yard dash and as tall as an office building of about 30 stories. The unit has a capacity of 30,000 bbl. daily. It and other facilities installed at a cost of $22,500,000 make the refinery the largest in Ohio. *(See story on page 62.)*

Lion's Share

Lion Oil Co.'s 333 per cent increase in crude output led all Texas producers, but others gained despite proration

Leigh S. McCaslin, Jr.

HOUSTON. — Substantial gains in production of crude oil in Texas were made by several producers last year in spite of the sharp reduction in allowables for the state as a whole.

Three companies in particular made spectacular gains during 1949. They are Lion Oil Co., Standard Oil Co. of Texas, and Sohio Petroleum Co.

Lion's increase was the most significant, with a 333 per cent increase in December production as compared with the first of the year. With a big shot in the arm from its Scurry County production, the company's output jumped from 69,091 bbl. in January to 229,807 bbl. in December.

Standard of Texas, which also has substantial Scurry County holdings, increased its production from 658,109 bbl. to 798,200 bbl. monthly during 1949. Sohio jumped from 41,393 to 52,810 bbl. monthly, largely as a result of its holdings in Lane City field, in Wharton County, Texas Gulf Coast, and new production in Comanche County in Central Texas.

The gains registered by these three companies are even more significant when it is realized that production of the state as a whole dropped considerably during the year. Daily production averaged 2,333,490 bbl. the first week of the year, but dropped to 1,976,700 by year's end. This represents a decline of 15.3 per cent.

Top rankers.—Figures on these companies' production are based on records of the State of Texas and represent operated production as distinguished from wholly owned production. A tabulation (see accompanying table) shows that the top five producers in the state have not changed rank since 1945. Changes are relatively minor in the remainder of the listing.

Cities Service Oil Co. gained two places in the ranking, while Amerada Petroleum Corp. dropped two. Companies bettering their position by one place include: Shell Oil Co., Phillips Petroleum Co., Continental Oil Co., Ohio Oil Co., and Standard Oil Co. of Texas. Five other companies dropped one place: Sun Oil Co., Atlantic Refining Co., Tide Water Associated Oil Co., Sinclair Oil & Gas Co., and Skelly Oil Co.

Eleven out of the 18 companies on the list have increased their daily production since 1945. They have done this despite the fact that annual production for 1949 for the state was down to 746,244,000 bbl. as compared with 755,533,000 bbl. in 1945. Four companies on the list suffered sizable declines in operated production compared with 1945. Humble is down 11.8 per cent; Tide Water, 10.5 per cent; Magnolia, 8.8 per cent; and Gulf 6.9 per cent.

The tabulation reveals that the big three in production of condensate are Humble, Phillips, and Skelly, in that order.

Production figures are not available for a large number of independent Texas producers. These include: American Republics Corp., Amon G. Carter, Houston Oil Co. of Texas, Quintana Petroleum Co., Richardson & Bass, Southern Minerals Corp., Transwestern Oil Co., and McCarthy Oil & Gas Corp. Some of these operators have as much production as some of the lower-ranking companies in the accompanying table.

LEADING TEXAS CRUDE PRODUCERS—1949

Rank 1949—Company	Total prod. 1949	Average daily prod. 1949*	Average daily prod. 1945*	Rank 1945	Average daily cond. prod. 1949*	Cond. rank 1949
1. Humble O. & R. Co.	95,027,911	261,000	296,000	1	3,460	1
2. Stanolind O. & G. Co.	49,170,797	135,000	129,800	2	865	7
3. Gulf Oil Corp.	43,967,084	120,000	128,900	3	775	8
4. The Texas Co.	32,263,958	88,300	89,600	†4	992	6
5. Magnolia Pet. Co.	29,825,168	81,700	89,600	†5	610	9
6. Shell Oil Co.	26,886,164	73,700	61,800	7	321	11
7. Sun Oil Co.	22,563,992	61,700	62,000	6	1,140	5
8. Phillips Pet. Co.	21,195,534	58,000	47,100	9	2,890	2
9. Atlantic Ref. Co.	18,436,765	50,500	49,900	8	112	18
10. Continental Oil Co.	14,884,430	40,700	36,400	11	156	15
11. Tide Water Assoc.	13,383,739	36,600	40,900	10	447	10
12. Ohio Oil Co.	11,832,988	32,400	26,200	13	217	13
13. Sinclair O. & G. Co.	11,816,553	32,400	33,800	12	108	19
14. Cities Serv. & Ark. Fuel	11,249,546	30,800	21,950	16	128	17
15. Pure Oil Co.	10,484,783	28,700	24,700	15	No figures	
16. Amerada Pet. Corp.	10,062,612	27,600	25,950	14	No figures	
17. Std. Oil of Texas	8,009,970	21,900	14,900	18	220	12
18. Skelly Oil Co.	7,164,940	19,600	19,500	17	1,500	3

*Slide-rule calculations. †Texas Co. and Magnolia tied.

Gas Proration

I.R.A.A. asks Texas body to prorate gas on crude basis

AUSTIN.—A request that the production of natural gas be prorated on the same basis as crude oil was made to the Texas Railroad Commission by the Independent Refiners Association of America at a hearing on the flaring of butane and propane before the commission here April 11.

Such equal treatment would reduce gas production by 26 per cent below its 1948 rate, the association said, and would bring production of butane and propane within market demand and thus eliminate their flaring.

As justification for its request the I.R.A.A. cited the loss of markets for Texas crude oil and its products, which it blamed in substantial part on the rapid increase in the marketing of natural gas. In its statement to the commission the association said:

"During 1948 the Texas petroleum industry enjoyed the largest peacetime demand for petroleum products in its history and commanded its just share of the nation's market. Crude-oil producing fields were performing at approximately the maximum efficient rate of production. Gas fields were producing according to market demand but the rate at which they produced was substantially less than the maximum efficient rate.

"Due to readjustments (one of which is the unlimited nonprorated gas production displacing crude-oil markets) Texas lost its market to other producing areas and the 1949 crude-oil production in the state amounted to only 83 per cent of the 1948 rate.

"Texas continues to lose its market and the downward trend has continued into 1950. The 1950 projected crude-oil production in Texas, based on January of this year, will be 78 per cent of 1948; if it were based on February the 1950 crude-oil production would be 77 per cent of 1948 and if based on March it would be 74 per cent of 1948. The state is suffering these losses in spite of the fact that the total demand for products in the United States continues to increase and is now at an all-time peak —even higher than 1948.

"An examination of the volume of products manufactured from gas, however, does not show an unfavorable history during this period and the trend is upward with a record higher than 1948, and a constant increase offsets the depressed condition of Texas crude oil. Where present crude-oil production has declined to

74 per cent of the 1948 rate, gas products have increased far in excess of the 1948 rate. It is conservatively estimated that the products produced from gas displace approximately 1,400,000 bbl. of crude oil daily.

"Using the A.P.I. statistics for the week of March 25, refineries located in inland Texas operated at 70.8 per cent of capacity and Texas Gulf Coast refineries operated at 82 per cent, or an average of 76.4 per cent, whereas crude-oil production is only 74.28 per cent of the 1948 average. With the crude-oil supply to refineries reduced to 74.28 per cent of 1948 production there should be a proportionate reduction to cycling plants.

"Twenty-eight Texas refineries are shut down and the remainder operate at an average of 76 per cent of capacity while 37 cycling plants have an operating average of 112 per cent of capacity. This is positive evidence that conditions beyond the control of these independent refineries have led to this depressed condition even though the refineries are the only market outlet for crude oil."

Salt-Water-Disposal Ruling

AUSTIN.—General rules for issuing permits to oil producers for disposal of salt water without the necessity for an individual hearing on each application have been adopted by the Texas Railroad Commission.

The rules provide that salt water may be injected into nonproducing zones in oil or gas formations already containing water unfit for general uses, provided the use of such zones is authorized by the Board of Water Engineers and provided disposal wells are cased and cemented to prevent damage to oil, gas, or fresh-water reservoirs.

WEST COAST

Gas Holdings Acquired

SAN FRANCISCO.—Vistario Corp., a newly organized firm, has acquired a partnership interest in Rio Vista gas field, about 50 miles north of the San Francisco Bay area and the largest gas field in California.

Vistario will own the property in partnership with Brazos Oil & Gas Co., wholly owned subsidiary of Dow Chemical Co.

President of the new firm is Henry Hottinger, partner of Wertheim & Co. Directors include Peter I. B. Lavan, Samuel Ballen, Otto M. Muhler, W. Joseph Straus, and Frank D. Williams, Jr.

New Device

Tool is designed to save earthquake-damaged wells

D. H. Stormont

LOS ANGELES.—In the Long Beach Harbor area operators for months have been trying to figure out the best method for reviving earthquake-damaged oil wells, and what steps to take to prevent other producers from becoming casualties if additional anticipated earth movements occur.

Shown on this page is the tool being used by one drilling contractor for saving these damaged wells. Designed by McCullough Tool Co. for Shamrock Drilling Co., the special cutter shown at the bottom of the 13-ft. "snake" is 24 in. in diameter but is only 15 in. long. Due to this short length, the tool therefore is capable of negotiating sharp bends while being "washed over" the section of damaged casing.

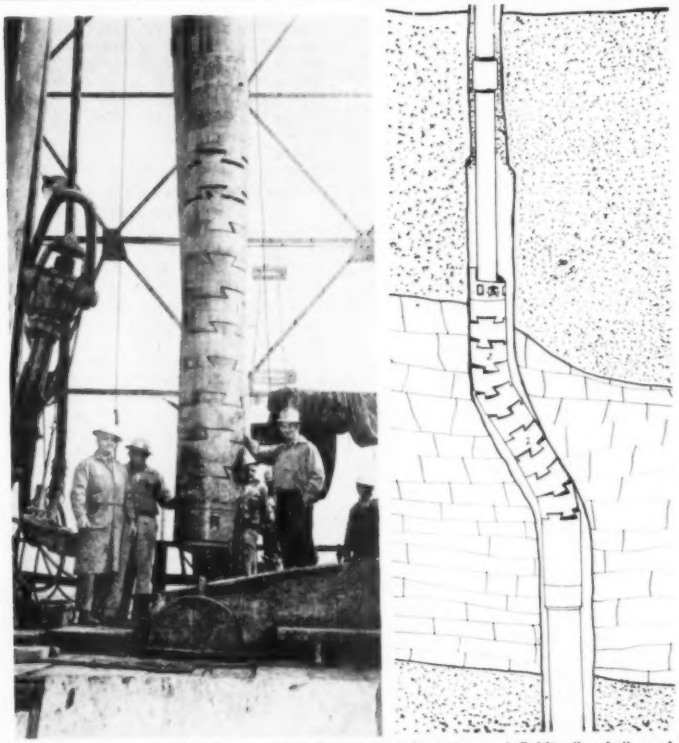
Two earthquakes, both relatively mild at the surface, caused the earth's substrata in the Terminal area to shift at a depth of around 1,700 ft. The first shift, on December 24, 1947, resulted in 108 producers being crippled, their casing being damaged at the point of slippage or their oil output curtailed. In the next 2 years 50 of these were redrilled or plugged off. Then on November 17 of last year a more severe movement took place.

In this quake all of the remaining 58 "crippled" wells were so severely damaged that they ceased producing, along with an additional 150 other wells which were untouched by the first shift. Also, 200 other wells became casualties to some extent.

The method most generally used in repairing these damaged or defunct producers has been to save the upper part of the well by cementing off the lower section. Hole was then whipstocked and redrilled to the producing zone.

Using this new method all of the $10\frac{3}{4}$-in. casing down to the damaged section at around 1,700 ft. was removed, the hole reamed out to 30 in. with special tools and the kinked section washed over. In the one well so far reworked, the special cutter was attached to the 13-ft. section of Zublin semiuniversal joints and the tool lowered over the remaining casing string. The cutter then was rotated over the fish, through the bend in the hole to a point below the offset, where the cut was made.

Last week hole was being conditioned to a point below the offset. When this was accomplished it was planned to contact and reconnect the original casing with a new 1,700-ft. string set in the 30-in. hole.



Left: Complete assembly of the world's largest outside cutter and Zublin "snake" ready to be lowered into the well. Right: Artist's conception of complete assembly after being rotated over the fish to a point below the offset where the cut was successfully made.

Texaco Strike

Five major refineries closed with no settlement yet in sight; more than 7,000 out, peaceful picketing reported

Henry D. Ralph

STRIKES by members of the Oil Workers International Union (C.I.O.) closed five major refineries of The Texas Co. April 4, and no settlement was in sight by the middle of this week. The closed refineries are at Casper, Wyo., Port Arthur and Port Neches, Tex., and Lawrenceville and Lockport, Ill. A strike vote was taken at the company's Tulsa refinery but no strike appeared likely here at this time. Other major refineries of The Texas Co. not affected are those at Los Angeles, Calif., and the recently opened refinery at Eagle Point, N. J.

The plants were shut down in an orderly manner, and peaceful picketing is under way. Union officials estimated that about 8,000 men are involved in the walkouts at the five refineries. The company placed the figure at about 7,000 men, of whom about 4,500 are at Port Arthur.

Union Statement.—At the beginning of the strike O. A. Knight, president of O.W.I.U., issued a statement from his headquarters in Denver which said:

"This is not a national strike against The Texas Co. Rather it is a series of local strikes which have been coordinated through O.W.I.U.'s Texas Co. council.

"Each individual group involved has voted by an overwhelming majority in favor of strike action. Under the constitution of our union, no strike can be called unless three-fourths of the people in the plant involved vote for it by secret ballot.

"Negotiations with The Texas Co. have been carried on by the various locals involved, on a local basis, for many months. Little progress has been made.

"A major issue in dispute in all the plants is improvement of the company's pension plan and inclusion of the plan in union contracts. Texas Co. pension policies are at present unilaterally laid down by the company without negotiations with the union.

"Also, all of the locals concerned are asking the company to agree to a share-the-work plan, in case unemployment in the oil industry increases sharply.

"What we are asking is that the company agree to reopen our contracts to discuss with us a return to the 36-hour work week, which prevailed before the war, whenever layoffs become serious. We are not asking a 36-hour week at this time, although The Texas Co. has laid off hundreds of employes in the past few months. But we want an agreement from the company to at least discuss this matter if it becomes necessary.

"An important point at dispute in many locals involves job classifications. Improper job classifications and disputed interpretations of those classifications have resulted, in many cases, in our members performing work of a higher skill than they have been paid for. In some cases, undermanning of plants and layoffs of our members have resulted.

"In addition, there are local problems in dispute which vary from plant to plant."

Company statement.—Officials of The Texas Co. declined comment on the strike until April 10, when the following statement was issued in New York:

"Bargaining has been in process over a considerable period of time at all of these plants between authorized local representatives of management and the union locals representing the units of employes determined by the National Labor Relations Board to be appropriate for bargaining purposes.

"The subjects which have been under discussion have varied somewhat from plant to plant, but generally involve proposed changes in the company's pension plan and accident and sick-benefit plan, the determination of job duties, and the 36-hour week. No demands have been made for increased wages, nor has any other demand been made which would involve any direct money payment to employes.

"The company has offered to make substantial improvements in its already generous pension plan, accident and sick-benefit plan, and hospitalization plan, and has been willing to include these plans in the labor contracts.

"The question with respect to the 36-hour week arises because of the unwillingness of the union to agree to a continuance of the present 40-hour week for the period to be covered by a new contract. The union desires to have the right to raise the question of the 36-hour week any time during the contract period and strike for it. As there is no certainty there will ever be any economic necessity for a 36-hour week during the life of the contract, the union, in so far as it is striking for this purpose, is acting in respect to an issue that may never become real.

"The company has difficulty in seeing any justification whatever for these strikes. It believes that the main purpose is to force the company to agree to the desire of the union's international officials to bargain on a nation-wide basis instead of on the plant-by-plant basis which has been followed by the union and the company for nearly 15 years and has been established by the National Labor Relations Board as the appropriate basis for bargaining by the company.

"All operations of the company other than at the struck plants are proceeding normally."

No Exemption for U.O.P.

CHICAGO.—Universal Oil Products Co. is not exempt from paying federal income taxes by reason of the fact that its stock is held in trust for the American Chemical Society, which is tax exempt as a nonprofit organization, it was held by the United States Circuit Court of Appeals here this week.

The court reversed a 1948 decision of a federal district court in a case involving several million dollars of profits since 1944.

U.O.P. originally was organized for profit for the purpose of research and development of petroleum - refining processes. Its stock was held by Standard Oil Co. (N. J.), Standard Oil Co. (Ind.), Standard Oil Co. of California, The Texas Co., Phillips Petroleum Co., Shell Oil Co., and N.V. Baatafsche Petroleum Mij. In 1944 the stock was transferred to Guaranty Trust Co. as trustee for the American Chemical Society.

The court noted that the original stockholders used U.O.P. patents free of royalty but that other refiners paid large sums in royalties, and rejected the company's contention that it should be tax exempt as a scientific and educational institution.

Shell Reserves Higher

Shell Oil Co.'s net crude-oil reserves totaled 833,000,000 bbl. as of January 1 compared to the last previous appraisal of 745,000,000 bbl. as of January 1, 1946.

This was disclosed by Alexander Fraser, chairman of the executive committee, at the stockholders meeting in New York last week. Fraser said the company's latest reserve position was "particularly gratifying when it is considered that in the intervening 4 years a total of 286,000,000 has been produced."

Synthetic Benzene

First commercial production of petroleum-base benzene now moving out of Texas City refinery of Pan American

George Weber

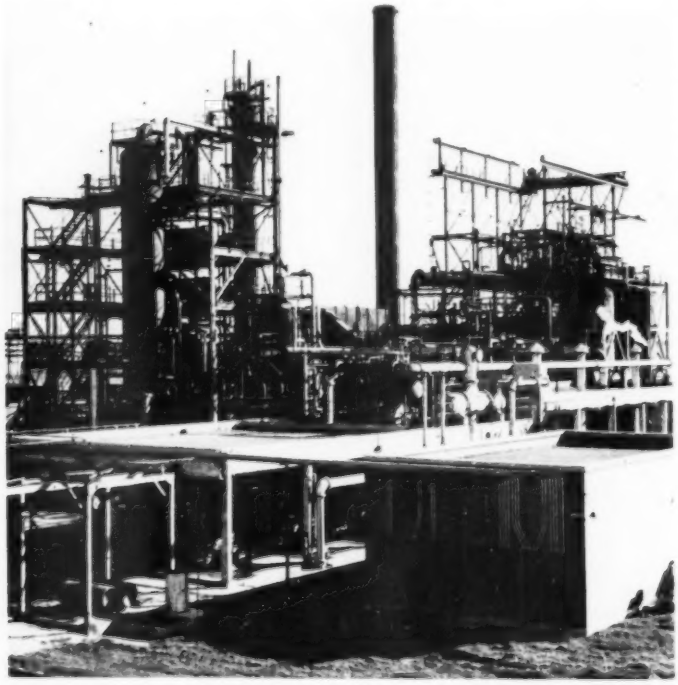
TEXAS CITY.—The first commercial synthesis of high-purity benzene from petroleum is now an established operation at the Texas City refinery of Pan American Refining Corp. Operated by the company's chemicals division, the new multi-million-dollar plant incorporates a hydroforming unit installed at the refinery in 1940. The plant's capacity is announced as "between three and five million gallons yearly."

Long interested in the possibilities of benzene synthesis, the company decided on the commercial project following a successful 2-week experimental run conducted a year ago. Quantity production has been maintained for the past 3 months.

Growing demand.—Chemical benzene from the new plant is produced to meet a fast-growing demand for the product in the Gulf Coast region. While petroleum benzene as produced at Texas City is not now competitive in price with coal tar or by-product benzene, the company's decision to enter the field stems from the erratic production from coal sources and the huge potential Gulf Coast market.

As a basic chemical in the manufacture of styrene, phenol, nylon, aniline, detergents and solvents, its use is growing. Consumption in Gulf Coast chemical plants is currently about 40,000,000 gal. annually, and a potential yearly demand for 70,000,000 gal. is projected in that area alone. Petroleum benzene is expected to supplement cheaper coal-tar benzene as demand exceeds supply of the latter product.

The Texas City product shows a boiling range within 1° C. and a freezing point of 5.1° C. It is free of hydrogen sulfide and contains less than 0.2 per cent of paraffin hydrocarbons. It is synthesized by dehydrogenation of cyclohexane and cyclization and dehydrogenation of methylcyclopentane.



This 7,500-bbl. per day hydroforming unit at Pan American Refining Corp.'s 114,000-bbl. refinery at Texas City was the first of eight such units built in this country. It is now employed in the first commercial production of synthetic benzene from petroleum. In the reactor section at right cyclic compounds are dehydrogenated to benzene and other aromatics which are separated in the fractionators at left.

Production plans.—The Pan American hydroforming unit, which was the first of its kind, was rated capable of reforming about 7,500 bbl. per day of 40-45 octane heavy naphtha charge. *(See The Oil and Gas Journal, March 27, 1941, page 87.).*

The unit will switch between straight hydroforming and benzene manufacture on a blocked operation. For benzene synthesis, a specially prepared, lower-boiling-range feed stock is employed. High-octane by-products from the benzene operation will be utilized in gasoline blends at the refinery, but blending of chemical benzene in gasoline is not anticipated. The new operation was established under the direction of Frank J. Smith, manager of Pan American's chemicals division.

Imports Drop

Crude down 20, residual 23 per cent from January rate

IMPORTS of crude and products into continental United States averaged 698,000 bbl. daily in February, according to Department of Commerce data. This compares with a daily average of 887,000 bbl. in January and 615,000 bbl. in February of last year.

Crude imports averaged 425,000 bbl. daily, a decrease of 20 per cent from the January record and 7 per cent below crude imports in the same month last year. A major part of the decrease was accounted for by a sharp reduction in receipts from Venezuela. Crude from Saudi Arabia was off 796,000 bbl. for the month.

Product imports, on a daily aver-

IMPORTS INTO CONTINENTAL UNITED STATES

(Thousands of barrels)

	Feb. 1950	Jan. 1950	Feb. 1949
Crude—			
Mexico	585	685	382
Colombia	1,176	1,389	670
Venezuela	7,344	10,857	6,969
Iran		123	440
Kuwait	1,983	1,892	1,946
Saudi Arabia	687	1,483	2,447
Other	116	108	
Total crude	11,891	16,537	12,854
Daily average	425	534	459
Products—			
Residual fuel	7,087	10,096	4,296
Other products	570	858	58
Total products	7,657	10,954	4,354
Daily average	273	353	156
Total all oils	19,548	27,491	17,208
Daily average	698	887	615

EXPORTS*

(Thousands of barrels)

	Feb. 1950	Jan. 1950	Feb. 1949
Crude	2,196	2,130	1,942
Gasoline	1,390	1,178	3,368
Distillate	1,028	649	1,093
Lube oils	1,149	941	870
Other products	1,116	1,358	1,643
Total all oils	6,879	6,256	8,916
Daily average	246	202	318

*Excludes shipments to territories.

age basis, decreased 23 per cent from January but were up 75 per cent from February of last year. The average for the month was 273,000 bbl. daily with residual fuel accounting for 92 per cent of the total.

Exports of crude and products, excluding shipments to territories, averaged 246,000 bbl. daily, compared with 202,000 bbl. daily in January and 318,000 bbl. daily in February 1949. Most of the gain over January was due to increased shipments of distillate and lube oils, but the big increase from last year was in gasoline.

GULF COAST

Rig for Students

HOUSTON.—University of Houston students who are studying petroleum engineering, mechanical engineering, and geology will have a completely equipped drilling rig with a 136-ft. derrick for actual on-the-campus training by 1951. Houston oilman H. R. Cullen has offered the rig as a gift.

A campus site for the rig, capable of drilling to 10,000 ft., will be selected by R. P. Akkerman, a geologist for the Gulf Oil Corp. There is a possibility that oil drilling operations might actually take place on the campus.

Marine Research

Offshore oil problems to be studied in new center

Leigh S. McCaslin, Jr.

COLLEGE STATION, Tex. — Offshore drilling problems will be a primary subject for study in Texas A. & M. College's newly organized department of oceanography.

A $50,000 reserve fund has been provided for equipment, and a complete shore laboratory is available to the department through the A. & M. Research Foundation.

Site of the laboratory is Grand Isle, La., long a shore base for operations in the Gulf. In the opinion of Dale F. Leipper, acting department head, it is "an ideal location for cooperation in problems concerning offshore drilling operations."

The new department is the only one of its kind on the Gulf Coast and is listed as one of the oceanographic centers of the United States.

Instruction is given only at the senior and graduate levels. Enrollment this semester is 56. Specific problems under study are corrosion and fouling, contamination control, beach erosion, and analysis of oceanographic factors affecting offshore structures.

Provision has been made for a staff of five men in the department, in-

ALONG THE GULF

Leigh S. McCaslin, Jr.

Magnolia's First

HOUSTON. — The hazards and costs of offshore drilling were spotlighted this past week when Magnolia Petroleum Co. announced its first oil discovery in the Gulf. Magnolia has spent $26,000,000 and drilled 16 wells over a 3-year period to bring in a single crude producer.

Of the 16 tests, 6 did discover oil or gas-condensate fields. However, marketing of gas and condensate has not yet been attempted from offshore fields.

Magnolia's new oiler has the distinction of being the farthest-offshore producer in the Gulf of Mexico. It is located 25 miles off St. Mary Parish. It is about 15 miles southwest of where Kerr-McGee Oil Industries, Inc., et al., brought in the first postwar discovery in the Gulf off Terrebonne Parish.

On a 2-hour test the Magnolia well flowed at the rate of 372 bbl. daily through perforations at 11,656-658 ft. Gravity of the oil was 32.3°.

Offshore Gas Sale

Reports persist that a contract has been signed for the sale of gas from an offshore field 8 miles from land and in 40 ft. of water. If true, this would be the first gas marketed from offshore fields, although 16 gas and gas-condensate discoveries have been made. It is rumored that a new pipe-line company is being formed to bring the gas ashore where it will enter one of the major transmission systems.

A few months ago, when only 11 gas and gas-condensate discoveries had been made, offshore gas reserves were estimated at 2 trillion cubic feet. The estimate was made by Henry C. Cortes and R. N. Gsell, two Magnolia Petroleum Co. exploration engineers. They ventured a guess that ultimate discoveries may be two to four times this figure, or a possible reserve of 8 trillion cubic feet.

Boundary Dispute

The Louisiana State Mineral Board is not eager to get into a fight with Texas over the location of the boundary between the two states. Such a possibility has been widely speculated upon in the newspapers of the two states since Ohio Oil Co. discovered oil a few weeks ago on the edge of the Sabine River.

Curbstone lawyers in Baton Rouge say that the Louisiana Purchase placed the Louisiana border at the west bank of the river. Later, when Texas entered the Union, that state's limits were set at the middle of the river. Thus the makings of a good legal struggle are present.

However, both states seem to feel that their fight with the federal Government over the tidelands is enough trouble for right now and that a "family" squabble would hurt their struggle with Uncle Sam.

A name well known to the oil industry as a builder of drilling barges, tugs, and other marine equipment is vitally interested in Ohio's controversial well.

Levingston Shipbuilding Co. owns a section of land only ⅝ mile distant and soon may be in the producing end of the oil business.

Digby for Governor?

Some quarters are suggesting that Conservation Commissioner S. L. Digby would make a good governor. The incumbent, Earl K. Long, cannot succeed himself, by state law in Louisiana.

Keeping Tab

Discussions with various members of the Louisiana Conservation Commission reveal that they share the concern of the Texas Railroad Commission over the effect of natural gasoline, condensate, and liquefied petroleum gas on the crude market. Louisiana is expecting to produce close to 40,000 bbl. daily of these liquid hydrocarbons during April.

Statisticians on the commission are keeping detailed records on production of the light hydrocarbons. For the past year the anticipated production has been included with the monthly crude-oil allowable figures. This provides a picture of the total liquid hydrocarbon production, rather than just crude alone.

At this stage of developments, no one wants to predict the eventual solution of the problem. Proration, in the same manner as crude, is mentioned, but in the same breath it is pointed out that long-term gas-sale contracts complicate this.

Dr. W. Armstrong Price, left, faculty member, and Dale F. Leipper, acting head, of the Texas A. & M. department of oceanography.

cluding experts in the physical, biological, chemical, geological, and meteorological aspects of oceanography.

At present Leipper, a physical oceanographer and marine meteorologist, and W. Armstrong Price, widely known coastal geologist, are teaching the first courses at College Station. The laboratory is under the direction of Dr. J. G. Mackin, professor of biological oceanography.

Creation of the department grew out of a 3-year marine investigation by the A. & M. Research Foundation.

"In the course of the work already accomplished," F. C. Bolton, college president, said, "it has become apparent that the Gulf Coast represents one of our greatest natural resources and that conservation measures are urgently needed. Any program of conservation or development should be based on fundamental research."

Liquidation Postponed

HOUSTON. — Proposed liquidation of the Salt Dome Oil Corp., Houston, has been postponed pending settlement of a lawsuit brought by a minority stockholder.

At a special meeting of the stockholders more than 69 per cent of the outstanding shares voted in favor of liquidation, and less than 2 per cent against. However, on the day prior to the meeting an individual holding 200 shares of stock sought an injunction against the proposed action.

The plan of liquidation which the company desires to follow for its properties is: (1) conversion of the company's one-half interest in production from leases held jointly with Standard Oil Co. of Texas, in Cedar Point field, Texas, into a perpetual overriding royalty equal to one-half of the net profits realized by Standard of Texas from the field; (2) sale of all other lease interests and properties, except for certain current assets of $800,000.

EASTERN

Sun Using Lead

Toledo refinery completion, new gasoline announced

PHILADELPHIA.—With the completion of new facilities at its Toledo refinery, Sun Oil Co. announced this week the introduction of a new gasoline using tetraethyl lead for the first time in the company's history.

For many years Sun has been one of the very few large marketers not selling any leaded gasoline.

It explained its change of policy by saying that its preeminence in the field of catalytic cracking has enabled it to produce gasoline of high antiknock value and that its new facilities will produce stock which with the addition of small quantities of TEL will provide a motor fuel of higher all-around quality meeting the requirements of the higher-compression engines now manufactured.

Refining capacities. — At a cost of $22,500,000 the Toledo refinery has been nearly doubled in size, and is now the largest in Ohio and the twenty-fourth largest in the United States.

The principal new feature is the Houdriflow unit, the first and only one of its kind in operation. This unit has an over-all height of 308 ft. and is claimed to be the tallest refinery structure in the world.

This quadruple-reactor catalytic cracker has a daily capacity of 30,000 bbl. of charging stock and will yield more than 600,000 gal. of gasoline per day. Most of the balance is furnace oil. It is designed for a high catalyst-to-oil ratio, permitting liquid injection of heavy-to-intermediate charging stocks.

In addition, the Toledo refinery has other catalytic cracking capacity of 16,000 bbl. per day and thermal cracking capacity of 17,000 bbl. per day, or a total of 63,000 bbl. daily. The refinery is designed for an ultimate crude-charging capacity of 70,000 bbl. daily.

Other new facilities recently completed at the Toledo plant include a crude-distillation unit with capacity of 30,000 bbl. daily; a gas compression, distillation, and purification plant; catalytic polymerization unit; steam-generating plant; water-treating facilities; compressed-air supply; electrical substation; 650,000 bbl. of new tankage; office and auxiliary buildings; and a $600,000 wastewater separator and disposal system.

Much of the crude supply will come via the Mid-Valley pipe line when this is completed from East Texas this fall. The Toledo plant is linked with Sun's Marcus Hook refinery by a 534-mile products pipe line described as an "underground shuttle" to provide flexible and unified operation of the two plants. The company claims that the new facilities at its two refineries give it the highest ratio of catalytic cracking capacity to total refinery capacity of any oil company.

No details.—Sun's announcement gave no details of specifications of its "New Blue Sunoco," nor the amount of tetraethyl lead to be used, but said it "offers a new high not only in antiknock power but in all-around road performance."

Sun said it would adhere to its policy of manufacturing and marketing only one grade of gasoline, and it will be sold at regular-grade prices.

NEXT WEEK

April 20 edition will be the Journal's Annual Natural Gasoline Number, and the edition will carry the largest amount of editorial material on this subject ever published by the Journal. Contents will include:

"The Natural Gasoline Industry's Leaders Appraise Its Problems and Suggest Remedial Measures" . . . Summary statements by various manufacturing authors.

"Trends in Modern Plant Design" . . . Summary statements by design-constructor companies.

Annual tabulation of individual gasoline and cycling plants. Includes location and capacity . . . plus the Journal's compilation of all current construction projects in this category.

"La Gloria Corp.'s New Expanded Gas Cycling and Casing-Head-Gas Natural-Gasoline Plant," by Homer C. Givens, plant superintendent, La Gloria Corp., Falfurrias, Tex.

Stanolind's Three New Natural-Gasoline Plants . . . Levelland—South Fullerton—North Pettus-Burnell.

"New, Safe, and Practical Storage and Transportation Method for Light Hydrocarbon Fuels," by C. V. Spangler, W. W. Bodle, and W. T. Granquist.

"New Sun Plant Serves Five Southwest Texas Oil Fields," by Roy F. Carlson, district editor, The Oil and Gas Journal.

"Platforming of Natural Gasoline," by E. K. Sutherland and D. D. Hanson, Universal Oil Products Co.

"Present Statistical-Economic Position of the Natural Gasoline-Cycling Industry," by John C. Casper, district editor, The Oil and Gas Journal.

Penn Grade Protest

Association spokesmen declare ECA financing of European refineries means surplus lube oils will be peddled here

WASHINGTON. — Limitation of ECA-financed European refinery construction to the prewar production level was urged upon Rep. Eugene J. Keogh of New York last week by representatives of the Pennsylvania Grade industry.

Testifying before the House Small Business oil subcommittee of which Keogh, its chairman, was the only member present, spokesmen for the Pennsylvania Grade Crude Oil Association complained that ECA policies are paving the way for the construction of lube facilities in Europe which will not only make the Marshall plan nations self-sufficient but will build up exportable surpluses to compete with United States producers in other markets.

The case for the association was presented by a delegation consisting of Donald C. O'Hara, attorney; J. P. Jones, director of production; Harry A. Logan, president of the United Refining Co., Warren, Pa., and Elk Refining Co., Charleston, W. Va.; John R. Schmidt, president of the Tiona Petroleum Co., Philadelphia, Rudolph Cubicciotti of L. Sonneborn Sons, Inc., New York, and S. F. Gysin, Bell Petroleum Corp., New York.

Vanishing market. — The group told Keogh that while they support the objective of the Marshall plan, ECA policies are shutting Pennsylvania Grade lubricants out of the European market by the financing of new plants and pressure on the European countries to purchase their lube requirements from other than dollar sources, even where the buyer prefers the higher-quality American oils.

There are 1,500 wells in the Pennsylvania area drilled but not yet put into operation, Jones testified. Supplementing this, Logan said that current production is approximately 4,500,000 bbl. a year, 1,000,000 bbl. of which is available for export which must be moved if the industry is to continue to be healthy.

Logan also declared that the Pennsylvania producers foresee the loss of all Latin American trade to Britain on the basis of the British agreement with Argentina.

The association complained not only of ECA policies but also of the restrictions and regulations which have been adopted by the Marshall plan countries, chiefly affecting the independent importer and tending to bar imports of dollar products. Italy, it was disclosed, has recently adopted a regulation permitting imports of American-made lubricants only if refined from sterling crude.

Expansion problems. — ECA officials have told the industry that the program would go through with the idea of bringing about the least possible dislocation but American refiners should adjust themselves to the fact there probably will be no exports by 1953, Gysin testified. Europe's prewar capacity was 24,000,000 tons and the ECA goal was 42,000,000 tons but the Organization for European Economic Cooperation has approved 62,400,000 tons, he said.

"It is difficult to understand why the rehabilitation program did not stop at the prewar 24,000,000 tons, especially when it was known that European countries had programmed on their own behalf an additional 11,000,000 up to possibly 20,000,000 tons, thereby bringing the total capacity to a maximum of 44,000,000 tons," Gysin told Keogh.

"If the principle of making every country self-sufficient, insofar as petroleum requirements are concerned, is accepted, then there could be no reason why the same could not be done with every other industry, with the result that in due course there would be no further exports of any kind from the United States."

Gysin pointed out that The Oil and Gas Journal figures on lubricating oil showed a surplus in the United States of 43,000 bbl. per day available for export in 1948 and estimated there would be 84,000 bbl. per day this year and 78,000 bbl. per day in 1953. For the same period, total foreign demand, outside of Russia and its satellites, was estimated at 37,000 bbl. daily for 1948 (U. S. surplus 6,000 bbl.); 32,000 bbl. this year (U. S. 52,000) and 35,000 bbl. in 1953 (U. S. 43,000).

"This alarming condition will be brought about by considerable increase in lubricating oil production abroad," he said.

Suggested solution. — "The solution obviously is not an artificial curtailment of exports, as American products would not be in demand if they were not needed. A realistic consideration of the problem cannot escape the fact that we should import more and as, admittedly and for many reasons, this cannot be done to any considerable extent with manufactured products, it should be along the lines of raw materials. In this respect, foreign crude would give a source of dollar income which might well bridge the gap and it so happens that it is a commodity which involves about the least amount of labor and, therefore, would not be a serious cause of unemployment."

The immediate export problem, Gysin said, is one of revising assistance for foreign refinery capacity, by adhering more closely to the generally accepted principle that Marshall plan aid as a matter of rehabilitation and not self-sufficiency, and countries receiving assistance should agree to allow trade to resume its flow through normal channels, without restrictions upon buyers who, whereas they were in business before the war, did not for some reason or other import regularly. Group and government buying should be eliminated, holders of import licenses should be made to import direct and not through local sources, and the red tape resulting in abnormal, and at times extremely costly, delays, should be reduced to a minimum.

State's View

Thorp outlines department's oil beliefs before Congress

WASHINGTON.—Oil, as an important commodity, is a major factor affecting foreign relations, but the interest of the State Department in foreign-produced oil should not be construed as a lack of interest in the domestic industry, Williard L. Thorp, assistant secretary, said last week.

It is necessary, however, that our position on oil questions be based on the total national interest "which is frequently a broader concept than the special interests of particular segments of the United States economy," he said.

Thorp's views were contained in a prepared statement read at another in the series of hearings on the oil situation being held by the House interstate commerce oil subcommittee.

Thorp emphasized the importance of American petroleum interests abroad and their contribution to the development of other countries as well as their importance to United States stockholders, equipment, and other manufacturers. By their taxes, militarily important tankers, and oil reserves overseas, he said, they contribute to our security.

"These overseas interests of American oil companies are a decided national asset and are a matter of concern to the department," he said.

View on imports.—While it would be a substantial loss in a commercial, political, and strategic sense and seriously harmful to our national in-

terest if these operations should be seriously curtailed, Thorp declared, 18 months of study have led the department to conclude that the domestic industry has not been seriously injured by imports so far or is threatened by those expected in the near future.

Imports for the first 6 months of this year are expected to average 750,000 bbl. a day notwithstanding the record imports of 885,000 bbl. daily in January, he said, supporting similar testimony submitted by representatives of other agencies who have appeared before the subcommittee.

"The effects of a substantial limitation of imports would be felt by the American companies producing abroad and their stockholders," he said, explaining that a return to the 5 per cent quota set up in the Venezuela trade agreement would reduce their sales by about 360,000 bbl. daily and in addition seriously affect Venezuela and other countries in which the oil is produced.

NPC Opposed

State Department objects to oil-policy-council bill

WASHINGTON. — The Department of State lined up with other agencies last week in opposition to the Harris bill creating a national petroleum policy council.

The bill, sponsored by Rep. Oren Harris of Arkansas, previously had been condemned by the National Petroleum Council and several agencies whose views on the legislation had been requested.

In a letter to the House Interstate Commerce Committee, the department said the objectives of the bill are good and that coordination between the various agencies and collaboration admittedly is not as effective as it might be, but it raised the question whether it is necessary to establish a separate council to achieve those aims and expressed doubt as to its advisability.

The necessary machinery for accomplishing substantially the same purposes as those set out in the bill already exists and can be improved, it was pointed out.

The letter took the position that the proposed council would in essence involve the same agencies which work together today and there is no additional factor which would insure that the personnel involved would work any more or less satisfactorily in one group than in the other.

Further, the department warned, the proposed council would be a supra agency imposed on existing agencies and able to dictate courses of action on matters for which particular departments have prime responsibil-

WATCHING WASHINGTON

Bertram F. Linz

Steel Pinch Again

Conditions which prevailed during the immediate postwar period, when allocations by producers and conversion deals by buyers were the rule, have returned to the steel industry, with no relief in sight before the end of the year.

Working to overcome the loss of production resulting from the coal strike, steel mills are currently working at 97 per cent or better of capacity, and every major mill in the country is fully booked for months ahead on every major product.

Because of the jam, steel is moving to customers on the allocation system and conversion deals are going strong. Some relief to consumers is developing through sharp increases in imports of steel, which is beginning to worry jobbers in the East.

Reports from the industry state that line pipe, one of the few items sold far in advance, is sold out well into 1951 by some producers.

Support for OGD

A threat to the life of the Oil and Gas Division raised by action of the House appropriations committee is being vigorously fought by industry leaders and Interior Department officials, who are looking to the Senate, where the OGD has more friends than in the House, to protect the government-industry set-up which carried the country through the tough supply situation in 1947-48 and has done much to insure proper thinking by the administration on major oil problems.

In its report on the omnibus appropriation bill, the House committee recommended discontinuance of the division as unnecessary and curtailed money for the secretary's office, which now includes the OGD, in such way that he would have no alternative to eliminating practically the whole division.

In his first annual report, Secretary Oscar L. Chapman spoke in highly commendatory terms of the achievements of the OGD and the National Petroleum Council.

Chapman has not yet made any formal disclosures of his position but is expected to fight for retention of the OGD, but NPC Chairman Walter S. Hallanan has already appealed to members of the Senate appropriations committee for their support and the matter also is expected to be a subject of discussion at the next meeting of the council April 26.

Gas Bill Verdict

Final verdict on the bill exempting independent producers and gatherers of natural gas from Federal Power Commission control is expected to come April 17, the last day on which the President can sign or veto the measure, and state and city authorities in the consuming area and opposing members of Congress have pulled out all the stops in an effort to induce him to kill the bill.

From the political standpoint, the President is faced with a hard choice of being damned because he does and equally damned because he doesn't. If he signs the bill, he will be accused of favoring the "big interests" against which he has consistently campaigned; if he vetoes it he will alienate a lot of friends and supporters in Congress, including such men of importance as House Speaker Sam Rayburn and Foreign Relations Committee Chairman Tom Connally, and imperil the reelection chances of some of the Democrats who voted for the bill.

Barring some effective work by opponents, however, the President is expected to sign the bill, explaining that he does so reluctantly and is relying on a provision authorizing the FPC to make a continuing study of gas prices as a protection against any undesirable results from his action.

Tidelands Decision

The possibility of congressional action this year on tidelands legislation may be decided April 20, when the House judiciary committee is scheduled to vote on the measure now before it, restoring title to the submerged lands to the states and defining the respective fields of the federal and state governments in the administration of the underwater oil fields.

Reportedly, Chairman Emanuel Celler of New York and Rep. Sam Hobbs of Alabama have been the principal opponents of the bill. Supporters of the measure, however, declare their effort to kill the legislation will be futile and predict it will be sent to the House floor for consideration.

Once on the floor, it is claimed, action will be secured within a month, and again victory is predicted. But whether it can be pushed through the Senate in the time remaining is doubtful.

ity, threatening the initiative and authority of the departments responsible for making foreign, military, or other policies.

A major objection to the Harris proposal lies in the possibility that the establishment of a petroleum council would establish a precedent for the creation of other commodity councils, the department said, leading to a multiplicity of commodity agencies with authority overlapping that of existing departments.

Pipe-Line Attack

Miffed congressman asks for railroad-type controls

WASHINGTON. — Amendment of the National Transportation Act to put gas pipe lines in the same category as railroads so far as ownership and operation are concerned was proposed last week by Rep. Eugene D. O'Sullivan of Nebraska.

O'Sullivan explained that since gas pipe lines were infant common carriers in an experimental field when the act was adopted they were specifically exempted from the general law governing other common carriers in interstate commerce, such as the railroads, which could not be owned by any person, firm or corporation and devoted exclusively to the sole transportation of the products of such owners.

This rule, he pointed out, has been applied by the Supreme Court to cases such as that presented by Ford Motor Co. where it was held that although the company owned a railroad and all of its equipment outright it could not use it for the exclusive transportation of its own iron ore but was obliged as a common carrier to haul freight for others also.

"In the case of these natural and artificial gas pipe lines," O'Sullivan told the House, "they are no longer an infant industry pioneering their way in a new venture. They have thrown off their swaddling clothes and have emerged forth as giants. They are dangerously powerful big business, big bankers, big financial dabblers at New York, Boston, Pittsburgh, and Chicago. . ."

O'Sullivan disclosed at least one reason for his interest in the matter when he said "no one can sell their natural gas to them and I know because I have tried to do so," and declared the pipe-line companies can "isolate and ruin" any independent owner of a developed natural-gas field.

Navy to Sell Elk Hills Oil

WASHINGTON. — The Navy Department announced last week that it will hold a public sale in Los Angeles April 26 of its share of the crude oil produced from the shallow oil zone of the Elk Hills, Calif., naval oil reserve.

The oil will be sold for a period of 3 years commencing on the tenth day following approval of a contract, with a provision that the contract can be terminated if Congress authorizes operation of the reserve for production rather than for its protection, conservation, maintenance, and testing, which is the present program.

The quantity of oil to be available is indefinite and will depend, among other things, upon practical considerations in field operations, the rate and continuance of production from the shallow zone under the unit-plan contract with Standard Oil Co. of California, and the quantities which the operating committee may reserve for use in connection with operations. It is anticipated, however, that approximately 80,000 bbl. a month will be available.

MID-CONTINENT

Shutdown Order

Overproduction charged to 24 companies in Oklahoma

OKLAHOMA CITY.—Orders shutting down production from 43 leases in 19 fields until previous overproduction has been made up were issued April 6 by the Oklahoma Corporation Commission.

Some of the leases were charged with producing in excess of the allowables fixed by the commission over a period of several months. The total overage was calculated at 58,000 bbl. Approximately 70 wells are involved and the alleged excess averages about 800 bbl. per well. The leases are in 19 fields and are operated by 24 companies. If the entire overproduction is made up in April it will reduce the daily average production in the state by about 1,900 bbl.

The commission's attorney was instructed to enforce the shutdown orders, but the operators were not charged with deliberate violation of monthly proration orders. The commission stated that some of the overproduction might be classed as technical violations due to failure to test or report completion of new wells.

Earlier the commission had set the April allowable for Oklahoma at 447,628 bbl. per day, an increase of about 10 per cent over recent months. For the first time in several years the commission required purchasers to submit nominations for Oklahoma crude.

This action followed a meeting with an industry advisory committee, appointed by the conservation department of the commission, at which some members criticized the commission for failing to keep a close check on new wells and figure their production in monthly allowables, others requested a more careful estimate of market demand for Oklahoma crude, and others demanded restoration of recent reductions in allowables.

The accompanying table, compiled by The Oil and Gas Journal, shows actual crude production in Oklahoma compared with allowables set by the Corporation Commission by months since the beginning of 1949.

OKLAHOMA CRUDE PRODUCTION

(Barrels daily)

1949	Crude production	Allowable
January	422,400	443,550
February	420,800	411,150
March	425,200	388,811
April	417,800	387,291
May	414,600	387,291
June	402,500	380,776
July	383,100	360,000
August	398,600	360,000
September	402,100	360,000
October	415,000	410,000
November	431,400	414,000
December	424,400	398,555
1950		
January	393,900	366,290
February	411,400	407,273
March	*421,500	407,273

*Estimated.

Deep Rock Strike

A strike which closed the refinery of Deep Rock Oil Corp. at Cushing, Okla., April 3 appeared near settlement at midweek as federal conciliators met with representatives of the company and the Oil Workers International Union (C.I.O.).

The issues were classification of workers and employment of outside contractors for construction and maintenance work.

The union's position was stated by an official as follows:

"This strike was called after negotiations broke down because of the company's insistence upon the exclusion from the bargaining unit of stillmen, wax-house engineers, centrifuge engineers, filter-house operators, gang pushers, janitors, and many other jobs which the company claimed to be of a supervisory nature but which are clearly of a routine nature."

Newspaper advertisements signed by the company said:

"During recent negotiation meetings, tentative agreement was reached on all important cost items, such as paid vacations and paid sick leave.

"Only two important issues were not settled at the time the union decided a deadlock had been reached. They were: (1) Whether or not the company would have the right to select outside contractors to perform certain maintenance and construction work, and (2) whether certain supervisory and technical personnel should be included in the union contract provisions."

SPECIAL REPORT

Toughest Pipe Line

Up-and-down Appalachian line to Washington, D. C., area may hold record for hazards and problems for many years

Paul Reed

THERE'S one group of pipeliners who will never believe the jibes to westerners that the East has no mountains worthy of the name.

They are the gangs that snaked a 26-in. gas pipe line across the Appalachians from Clendenin, W. Va., to Rockville, Md., for Columbia Gas System, Inc.

The Appalachians may lack the breath-taking altitudes and spectacles of the Rockies, but this bunch of pipe liners knows that they are real mountains. They had to develop several novel methods of handling equipment and laying the pipe in order to accomplish the job.

The West Virginia mountains are a series of steep ridges running north and south. The pipe line runs east and west. That meant that the line couldn't wind along through easy passes, but had to climb straight up and down one ridge after another. Many of the grades were 60 degrees or worse, and one 1,800-ft. section in the Smoke Hole district near Petersburg, Va., went up a 45-degree slope.

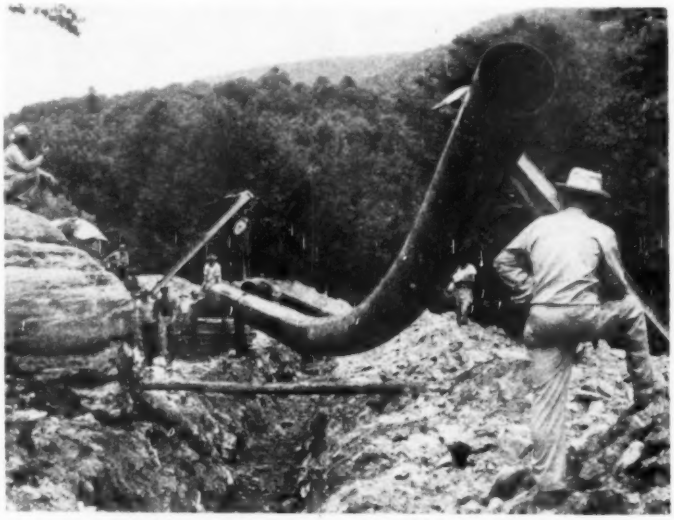
Approximately 150 miles of the 268-mile line was through this kind of mountainous territory. The highest elevation was 4,000 ft., and many of the ridges were more than 3,000 ft. in altitude. There were numerous river crossings, the largest across the Shenandoah and Potomac rivers.

The crews called the job the "Toughest Inch," because the obstacles beat anything they had tackled before. The owner might well have called it the "Money Inch," because the cost of laying amounted to the all-time high of $15 per foot, or nearly $80,000 per mile.

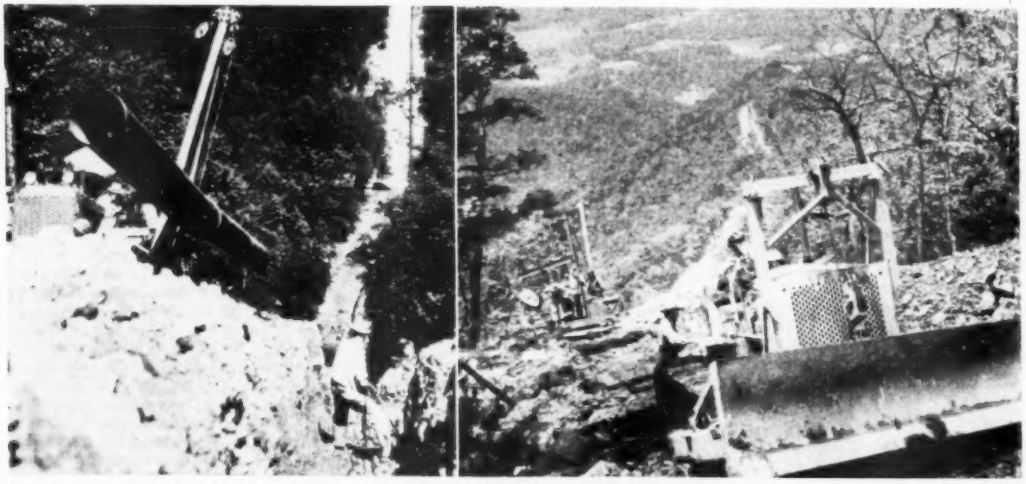
Orthodox methods of ditching and stringing proved useless on the steep, rocky slopes. Everything had to be winched up and anchored. Strong cables and the use of several tow tractors were required to move heavy machinery up and down the ridges. Never before had pipe of such large diameter been laid under conditions so hazardous.

To move a Buckeye ditcher on a 60-degree slope required four to six winch tractors for lowering down and then dragging back. Under these conditions it was hard to ditch more than 500 ft. per day.

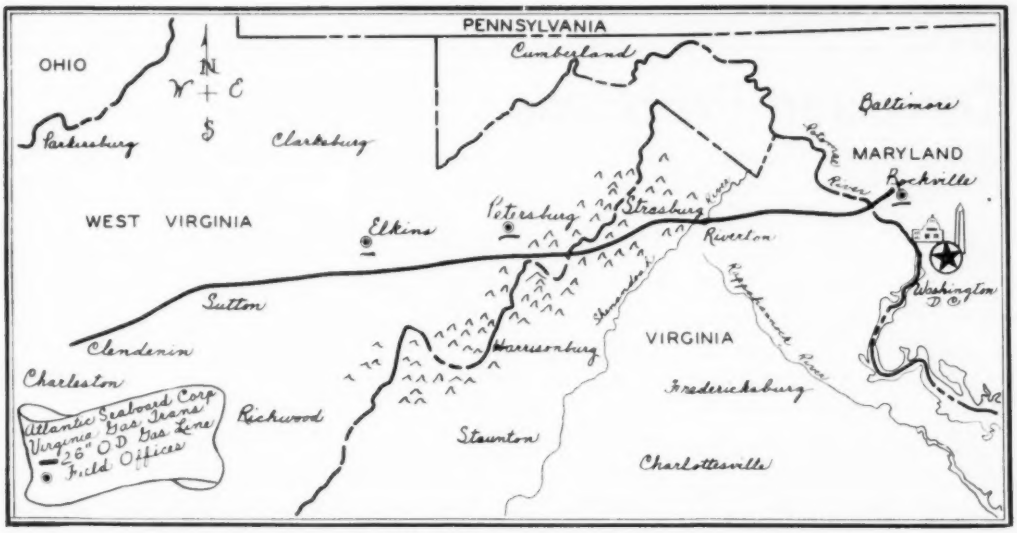
In many sections, where moun-



Sideboom tractors jockeying a bent section into place.



Left: Stringing being done by boom tractor on the side of an Allegheny mountain. Right: Bending machine being towed by a dozer and pushed by boom tractor to move it up a steep slope.



Map showing the route of the 268-mile, 26-in. line from Clendenin, W. Va., to Rockville, Md.

tains and mud impeded operations, pipe had to be transported from the stringer trucks to the right-of-way by tractors. Frequently the laying of six joints had to be regarded as a good day's work.

The route was so rocky that more than 140 miles of ditch had to be blasted, necessitating the use of 1,500,000 lb. of dynamite.

Blasting a trench across the solid granite bottom of the Potomac River required more than 60 tons of dynamite to open a ditch 1,500 ft. long and 25 ft. wide. In this operation 1,048 holes were drilled 8 ft. deep and then loaded with high-velocity 60 per cent dynamite. Multiple-joint sections with coating and river clamps were pulled into position by putting the end of the section on a barge which was maneuvered across the river for lowering into the trench.

In many places there was no dirt to form a cushion in the trench and protect the pipe against damage from the rocky backfill. As a substitute for dirt padding, coated sections were protected by a stiff wrapping material called cushion plate or rock shield. The line was coated only in certain areas where moisture conditions made it imperative.

Among the construction techniques employed on the job were the utilization of smooth bending, inspection of welds by internal and external X-ray methods, and communication by two-way radio.

All bending was done by the use of the newly developed Coody hydraulic smooth-bending machine, which proved to be satisfactory even in the most mountainous areas. It was quite common to make 65 to 85 bends in one day—sometimes more than 100. In very steep sections four out of every five joints had to be bent.

The line is now in operation by two of Columbia's subsidiaries—Atlantic Seaboard Corp. and Virginia Gas Transmission Corp. At Clendenin it takes gas from the main line of Tennessee Gas Transmission Co. and supplies Baltimore with natural gas for the first time as well as augmenting the supply for Washington.

Two contractors laid the 268-mile line. Ray L. Smith & Son, Inc. laid 62 miles at the western end. H. C. Price Co. had the contract for the other 206 miles between Cleveland, W. Va., and Rockville, Md., a suburb 10 miles from Washington.

Price had three main-line spreads and two river-crossing gangs at work on the job. C. S. LeNoir supervised all operations, while spread superintendents were R. K. Shivel, C. R. Ice, and W. B. Williams. River crossings were supervised by E. D. Worley at the Shenandoah and by Ray Drewell at the Potomac. The work of Ray L. Smith & Son was supervised by W. G. Frost and Don Smith.

Laying a section of pipe across one of the many mountain streams encountered during the project.

Corrosion Problems

New techniques, ideas, materials for use in continuing fight on corrosion described at annual N.A.C.E. meeting

Paul Reed

ST. LOUIS.—The rapid increase in the use of magnesium anodes for cathodic protection is exerting far-reaching influence on the techniques of corrosion mitigation. This was conspicuously reflected in the sixth annual conference and exhibition of the National Association of Corrosion Engineers at the Hotel Jefferson here April 4-7.

A large proportion of the 951 registrants were oil and gas company engineers and suppliers serving these two industries. Pipe-line men formed the largest single group and it appeared that most of the 77 exhibitors were concerned with furnishing materials and services for petroleum and natural-gas pipe lines.

This association, originally organized by pipe-line corrosion engineers, has become a national organization for the exchange of data between technical men engaged in diverse activities. The 1950 convention even included a food-industry symposium.

Marine problems were prominent both in regard to the protection of offshore structures for oil production as well as for moored and moving ships. Pioneering studies of protection of ships by magnesium anodes by the Canadian Navy were recognized as outstanding technical contributions. Application of magnesium anodes for safeguarding the anchored "moth ball" fleet of the U. S. Maritime Commission is expected to effect a $100,000,000 saving.

Corrosion problems of petroleum refining, production, and pipe lining were widely discussed throughout the sessions.

It was predicted that companies operating diesel-engine and gas-engine-driven compressors will derive much benefit from the recommendations presented for the elimination of water-side deterioration of diesel-engine cylinder liners. Recommendations call for reduction of liner vibration, development of more resistant liner metal, application of chromate water treatment, maintenance of high water temperatures and pressures and introduction of air bubbles to serve as cushions against bubble collapse.

Within a little more than 2 years the relation of magnesium anodes to rectifiers for new installations for cathodic protection has been reversed from being formerly 90 per cent rectifiers and 10 per cent magnesium anodes to the present situation where 90 per cent of pipe-line protection furnished by currently installed facilities is of the magnesium anode type while 10 per cent is of the rectifier-ground bed type.

At the pipe-line-protection round table it was pointed out that the cost of corrosion is so much higher than any means of protection that more effort should be made to sell management. When a line has a good coating, rectifier current cost is so little that it was remarked that it is hard to find in the electric power bill. Rectifiers can be used effectively where big doses are needed. Where distribution of current for cathodic protection is desirable, magnesium anodes can be used at 25 per cent the cost of rectifiers. These anodes have the advantage of being self-throttling and of putting current where needed. Magnesium ribbon is giving good results in soils of high resistivity.

Corrosion is not such a serious problem in the North as it is in the South of the United States because of climatic and geologic conditions.

Officers, directors, and pipe-line engineers at the annual convention of National Association of Corrosion Engineers, Hotel Jefferson, St. Louis, April 4-7. (Standing) D. C. Glass, Pure Oil Co., Chicago, director (1949-52); Tom L. Holcombe, Holcombe & Stearns, Shreveport, director (1947-50); R. A. Brennon, Humble Pipe Line Co., Houston, treasurer (1950-51); E. P. Noppel, Ebasco Services, Inc., New York, chairman, policy and planning committee; R. L. Bullock, Interstate Oil Pipe Line Co., Tulsa, cochairman, pipe line protection round table; D. Dweede, Standard Oil Development Co., New York; Alvah C. Broyles, Carter Oil Co., Tulsa; Leslie A. Baldwin, Johns-Manville Sales Corp., New York, chairman, regional management committee; Thomas F. P. Kelley, James E. Mavor Co., director (1950-53). (Seated) J. C. Stirling, Stanolind Pipe Line Co., Tulsa; John M. Pearson, Sun Oil Co., Philadelphia, director (1947-50); R. B. Mears, Carnegie-Illinois Steel Corp., Pittsburgh, president (1949-50); Vance N. Jenkins, Union Oil Co. of California, Wilmington, Calif., president (1950-51); N. E. Berry, Servel, Inc., Evansville, Ind., vice president (1950-51); L. F. Scherer, Texas Pipe Line Co., Houston, director (1947-50). Newly elected directors not in the group are: Aaron Wachter, Shell Oil Development Co., Emeryville, Calif.; V. V. Malcom, Philip Carey Manufacturing Co., Cincinnati, Ohio; and H. D. Murray, Cren-Ray Plastic Products Co., Midland, Tex.

Decomposition of organic matter is less in the North. Furthermore, the glacial sheath present in the northern states allows drainage and leaching, which reduces corrosion conditions in marked contrast with those prevailing in the cap-rock areas characteristic of much of the southern half of the country. Swamps in the north are not regarded as corrosive while swamps in the south are very corrosive.

Since corrosion in water depends upon the presence of oxygen, corrosion is practically nil in structures deeply buried in lake water.

For combating internal corrosion in sour crude-oil pipe lines the mixing of powdered zinc in the stream has given helpful, but not complete, protection.

The need for close study to identify corrosive areas in regions which generally appear favorable was stressed.

In the papers delivered significant data include the following:

Ten years' experience with sodium nitrite inhibition has increased capacity of products lines and reduced costs through elimination of scraper operation.

Soda-ash solutions applied in wells in the Katy, Tex., field during 4 years has minimized corrosion cost. Total application is $50,000 per year or 28 cents per million cubic feet of gas produced. Control of corrosion at Katy is almost complete.

The surface-potential method may be easily taught to field personnel. It is highly accurate for locating previous leaks and for determining reconditioning to be done, as well as the proper application of anodes and the location of coating imperfections.

Annual cost of cathodic protection by appropriate methods at offshore drilling platforms is expected to be reduced to 4 cents per square foot for an extended period due to the effect of calcareous deposits on surfaces to be protected.

At the banquet the 1950 awards were presented: R. H. Brown, assistant chief of the chemical metallurgy division of Aluminum Research Laboratories, Aluminum Co. of America, New Kensington, Pa., received the Whitney Award for achievement in the field of corrosion science. O. C. Mudd, senior corrosion engineer, Shell Pipe Line Corp., Houston, received the Speller Award for distinction in the field of engineering.

Abstracts of some papers presented at the convention will be published in the April 27 issue.

P.I.E.A.-P.E.S.A. Meeting

HOUSTON.—Varied uses of radio communications in the petroleum industry, including use of microwave-relay installations on pipe lines, will be discussed at the Petroleum Industry Electric Association - Petroleum Electric Supply Association joint meeting in Houston April 18-20. All technical sessions will be held in the Shamrock Hotel.

Papers to be presented in the three technical sessions include:

"Miscellaneous Radio Service as it Pertains to the Petroleum Industry," by Glen Nielsen, Public Safety and Special Services Division, Federal Communications Commission; "Practical Considerations for Petroleum Industry Mobile Radio Communication Systems," by Joseph H. Wofford, communications consultant; "Insulated Electrical Wires and Cables," by E. D. Youmans, vice president and technical director, the Okonite Co.; "Practical Application of Microwave on Long Systems," by M. G. Staton, manager, Microwave Relay and Channeling Sales, Radio Corp. of America.

"Electrical Grounding in Its Several Phases and Their Correlation in a Single Plant," by E. B. Curdts, assistant director of engineering, James G. Biddle Co.; "Lighting for Safety," by H. L. Logan, vice president of research, Holophane Co., Inc.; "Multiple-Voice Super Highways by Carrier Waves," by Dr. J. O. Perrine, Bell Laboratories, American Telephone & Telegraph Co.; "Microwave Relay System for Petroleum Industry," by L. W. Goostree, Jr., General Electric Co.; and "Demonstration on Exploding Mixtures in Conduit Systems," by G. M. Kintz, supervising engineer, Bureau of Mines.

TECHNOLOGY

Gas Deviations

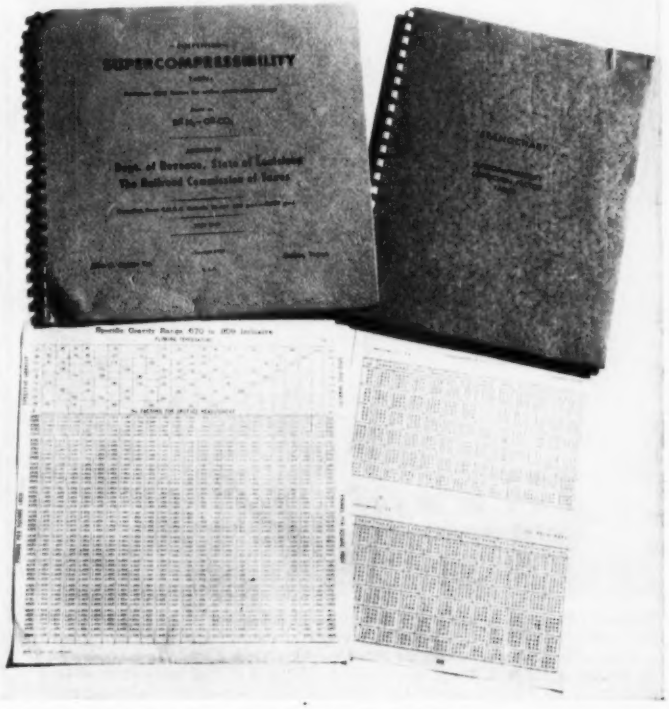
Two new methods for computing gas volume prove big time savers, add accuracy; industry putting them to work

Kenneth B. Barnes

TWO new short-cut methods for determining the deviations from Boyle's law in measuring natural gas under various conditions of pressure and temperature have recently been introduced into the industry and are receiving rapid acceptance.

The methods have been approved by the regulatory bodies of Texas and Louisiana, both of which have laws establishing standard measurements for natural gas and requiring corrections for deviations from the ideal gas laws.

Each method consists of a book of



Covers and specimen pages of the two new books of tables for correcting gas measurements for deviations from ideal gas laws.

tables used in the same manner as tables of logarithms or interest payments and amortization. Essentially they are a condensation of the elaborate computation procedures established by the Natural Gasoline Association of America and the California Natural Gasoline Association.

They contain factors for all combinations of gas pressures, temperatures, and specific gravities. One has been published by John P. Squier Co., Dallas gas engineers, and the other by Stanolind Oil & Gas Co., Tulsa.

These shortcut gas methods are working out to real value, particularly for companies dealing with a large number of gas measurements which must meet the Texas and Louisiana requirements. One user with Magnolia Petroleum Co. timed the new tables against the former laborious computations, and found them to be 12 times faster; also that more accuracy was obtained due to the different steps necessary in the former long computations.

State requirements.—In Texas a law enacted last year requires all transactions involving natural gas to be accounted for on the basis of a "standard" cubic foot of gas, defined as taken at a pressure base of 14.65 psia. and a temperature base of 60° F.

In Louisiana, new regulations of the state revenue department require natural gas to be measured and corrected to 10 oz. above atmospheric pressure (assumed 14.7 psi. or 15.325 absolute), and a temperature of 60° F.

Regulations in both states authorize the calculations of deviation from the ideal gas laws by use of methods prescribed by N.G.A.A. or C.N.G.A., or other acceptable methods based on these bulletins.

Deviation explained. — Gas deviation factors have long been well recognized in the oil and gas industries and often are a part of contractual agreements dealing with gas measurements, particularly at high pressures. Deviation from the ideal gas laws also is frequently referred to as the gas' "supercompressibility" and sometimes as "superexpansibility," one being the reciprocal of the other.

Whether the natural gas phenomenon of deviation from the ideal gas law ($PV = nRT$) is called deviation, supercompressibility, or superexpansibility, the physical action is caused by the molecular attraction of the gas molecules for one another, and increasingly so at high pressures.

A person dealing with high-pressure gas may make serious errors unless he uses the deviation factors. In brief, unless the supercompressibility is accounted for when he transfers natural gas he may get less money than his due, or he may let go of more gas than he thinks he is transferring. When a gas is compressed, the molecular attraction of the gas molecules and the applied pressure act in the same direction. The result is that the gas behaves as if it were subjected to a pressure greater than actually applied. Or, at the given pressure, due to deviation, there is more gas actually present than might ideally be expected.

Specific example.—A typical case of a natural-gas deviation correction would be: The gas data are specific gravity .807, flowing temperature 43° F., flowing pressure of 1,110 psi. The deviation-correction factor is 1.304. Thus, while an orifice meter reading "uncorrected" for deviation might total 1,000,000 cu. ft. of gas, actually the true volume is 1,304,000 cu. ft. This is a difference of 30.4 per cent.

The industry long has relied on the published bulletins of the Natural Gasoline Association of America and the California Natural Gasoline Association, in making gas deviation corrections. The computation procedures, however, are somewhat tedious. The computations use the pseudocritical method of correlating supercompressibility factors, which is based on the theorem of corresponding states. According to this theorem, the supercompressibility factor will be the same for different gases when at the same corresponding state. The corresponding state is found at the same fractions of the critical temperature and pressure which are known respectively as the reduced temperature T_R and the reduced pressure P_R.

All gases have the same supercompressibility factor at the same reduced temperature and pressure, and a plot of supercompressibility factors for any one gas as a function of its reduced temperature and reduced pressure can be used to determine the unknown supercompressibility factors for another gas, if the critical temperature and critical pressure of this other gas are known. This assumption has been found correct for similar gases and when properly used, for gaseous mixtures.

The C.N.G.A. procedure requires computing a number of intermediate data before obtaining the final deviation factor. And a lot of figures can go into the calculations. One engineer computed that the range of pressures, specific gravities, and temperatures obtained in the Southwest United States could total more than 700 million different combinations.

BIG RIG.—Described as one of the largest power rigs afloat is this one recently put into service in the Gulf on a 13,000-ft. test off Terrebonne Parish by The Texas Co. The rig, although it has neither the tallest derrick nor the largest barge, is designed for drilling to 20,000 ft. The drilling barge is 170 by 54 ft. and has a draft of 12 ft. Fuel-oil storage is approximately 1,400 bbl. Last year the company drilled the year's deepest well in the Gulf Coast area, going to 16,106 ft. in the Queen Bess Island area, Jefferson Parish. This well was only 550 ft. short of coast record, drilled in 1944.

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British Reply Awaited

Direct answer would have to say whether British seek to promote sterling-oil trade or are trying to save dollars

Bertram F. Linz

WASHINGTON.—The State Department this week was awaiting a response to its proposals for settlement of the sterling-dollar oil controversy.

These proposals definitely placed the British Government in a position where it will have to say whether its curtailment of dollar oil imports was actually for the purpose of saving dollars or to further world trade in sterling oil.

That question was implicit in the department's proposal that American companies be permitted to compete in sterling areas and in third markets, accepting the average dollar cost of producing sterling oil converted to dollars and using the remaining sterling for expenditures in the sterling area.

This suggestion reportedly got a cool reception in London. British authorities might prove more receptive, it was said, to another suggestion, discussed informally between the department and the companies, under which the present imports restrictions would stand but other British-controlled markets would be opened to American sellers. This suggestion is viewed by oil producers as a slight concession and is believed not to be acceptable.

The British problem was reviewed last week before the House interstate commerce oil subcommittee by Assistant Secretary of State Willard L. Thorp.

EXPLORATION IN ENGLAND.—This shot-hole rig is operated on the British Isle of Wight in a campaign to prepare a seismic map of the island's strata. A wildcat is planned for drilling on the island upon completion of the present exploratory program. Previous exploratory work has indicated the presence of oil, but no commercial production has been obtained. This shot hole is being drilled near the city of Newport. The island is in the British Channel, just off the coast from Southampton and Portsmouth.

The problem.—Thorp said the current displacement of American oil is serious enough, but that the department's greater concern "is largely over the consequencies of a continuing and increasing displacement."

He implied that he considered the 4,000,000-ton cut in fuel oil and gasoline imports this year "unnecessary to accomplish its avowed dollar-saving purpose."

"While time would be required for the construction of facilities and large sums would be needed for investment in these facilities," Thorp said, "the extent of British oil resources is such as to place no effective limit on the amount of displacement of dollar oil in foreign markets, so long as present exchange and trade controls exist."

Thorp made it plain that the department doubts the British excuse that the substitution of sterling for dollars was necessary to accomplish the desired dollar saving results.

"With respect to geographic area of production and the basic factors of cost and price, there is little significant difference between sterling oil and dollar oil," he said. "Whether sterling or dollar oil, a substantial and unavoidable part of the production cost is incurred in dollars. This factor is the one which may be most important in finding a solution making possible an important dollar saving to oil-importing countries without the necessity of a large displacement of dollar oil in world markets."

Thorp pointed out that the displacement order was only one of several incidents which tended to restrict the market for dollar oil. He cited as another the Anglo-Argentine agreement of last June to make available for sterling payment virtually all of Argentina's import requirements, about 40,000 bbl. per day, or 42 per cent, of which had formerly been supplied by American companies.

As a result of the several moves of the British, he told the subcommittee, sterling oil now has displaced about 135,000 bbl. daily of dollar oil, which is equivalent to about 9 per cent of the total overseas production of American companies.

Possible solution.—The latest proposal of the department, Thorp said, "if accepted, would deal with the problem on a basis permitting dollar savings for the British and retention of outlets for American company oil.

"In essence," he explained, "the proposals suggest that American companies be permitted to compete to sell oil for sterling in the sterling area and in third markets to the extent that their own oil has been displaced or would otherwise be displaced by sterling oil. For such sales they would receive the average dollar cost of producing sterling oil converted to dollars, and the remaining

sterling would have to be used for certain types of expenditure in the sterling area. It could not be accumulated in burdensome amounts.

"In our view," Thorp commented, "the proposal should go far to meet the British problem, since under it they will save the same amount of dollars as it would be possible to save by substituted British-company oil, that is, approximately $50,000,000, and at the same time they would have assurance against indirect or eventual dollar drain through the provisions with regard to sterling accumulations. This approach is helpful to the American companies, which have in general recognized the dollar difficulties of the British and their possibilities of saving dollars on oil account."

Thorp denied printed reports from London that nine sterling countries had agreed to cut their dollar oil imports, explaining the meeting was not called to develop any common policy with respect to curtailment of oil but was a long-scheduled meeting for statistical purposes and the implication of joint action in the reports of the meeting were "not correct."

LATIN AMERICA

Delay in Peru

Oil law's status uncertain as new government planned

PLANS for an election and the establishment of a constitutional government in Peru have made the outlook uncertain for the new petroleum law that was proposed late last year.

Instead of promulgating the law by decree in the near future as was originally expected, indications now are that Brig. Gen. Don Manuel Odria, head of the military junta, will wait and place the law before the Congress which is scheduled to be elected this summer.

The law was drafted by a special commission, and although it has some objectionable features, it is considered to offer foreign oil capital a reasonably workable basis for exploratory operations in the country. *(Its terms were summarazied in The Oil and Gas Journal, January 12, page 41.)*

Both congress and a president are scheduled to be elected in July, but there is a possibility the elections may be delayed until fall. Oil legislation has often been a bitter political issue in Peru, and, while General Odria's influence is strong, it is feared that the proposed law would never come out of Congress in its present form.

The oil companies interested in operations in Peru were in general prepared to accept promulgating the law by decree, which would have been acceptable as the action of a recognized de facto government. Waiting for the Congress means not only further delay but also the possibility of renewed controversy and amendments which would reflect the nationalistic sentiment of some factions and make the law unfavorable, if not impossible, for foreign oil investment.

Among the principal objections to the law as it now stands is a provision which says that concessions will be lapsed for, among other things, failure to conduct exploitation within 3 years.

Conorada Petroleum Corp. has obtained a nonexclusive permit to explore the Sechura Desert basin on the coast of Peru. Conorada is the only company to take advantage of the provisions of the decree law promulgated last September which allows exploration work.

The action also marks the first time that Conorada has engaged in actual operations. The company was organized in February 1949 by Continental Oil Co., Ohio Oil Co., and Amerada Petroleum Corp. to carry out exploration for its parent companies in areas other than United States and Canada.

The Sechura Desert is a vast area of several million acres. In it, Conorada is to carry out a preliminary survey using gravity meter. Several years ago International Petroleum Co., Ltd. (Jersey Standard), the present major operator in Peru, offered the Peruvian Government a special contract for rights in the Sechura. This was never approved by the congress and, although not formally nullified by the government, it is now considered dead.

FAR EAST

Red Pattern

Joint company to develop Sinkiang's oil resources

THE usual pattern of Russian economic penetration has been revealed in the announcement by Soviet Russia and Communist China that a joint company will be organized to develop oil resources in China's extreme western province of Sinkiang.

Moscow reports said the two governments had reached a 30-year agreement to set up two companies, one for oil and the other for nonferrous metals. Investments and profits are to be divided. Half of the employes will be Chinese and half Russian.

Sinkiang is in Central Asia north of Tibet and across the border from the Kirgiz region of Russia, where the Soviets have a number of producing fields. As far as is known, there is no production in Sinkiang, though Russian press reports spoke of its rich oil and mineral resources. Similar joint companies to develop petroleum have been organized in some of the Communist satellites of Eastern Europe.

Reports from Hong Kong last week showed the pressure being placed on remaining foreign oil interests within Communist China itself. Communist authorities in Canton were considering arrest of the managers of 10 foreign companies, including Shell, Standard-Vacuum Oil Co., and California-Texas Oil Co., Ltd., for failing to pay "Victory Bond" quotas. Henry Barros represents Caltex; Standard-Vacuum has a Chinese manager; and Shell has a staff of four under Chrys Robertson.

Foreign oil marketing operations in China are on a caretaker basis as far as the American companies are concerned. The Chinese market for oil has been largely written off. Even were it not for lack of State Department policy, the Nationalist blockade and the hostile attitude of the Communists themselves prevent trade.

EUROPE

German Reserves Up

Western Germany's oil reserves have been ranked in a class with those of Argentina and Trinidad as a result of new estimates made by the government's Amt fuer Bodenforschung (Geological Research Office).

Taking into consideration last year's discoveries, the agency placed Western Germany's proved and probable reserves at 36,500,000 tons, or about 260,000,000 bbl. This consists of oil in fields in Hanover, Emsland, Schleswig-Holstein, Hamburg, and Baden.

The new estimate compares with 20,200,000 tons reserves reported by the same agency last year. The increase of 80 per cent reflects the success of the exploratory work in Western Germany last year. The German industry is particularly encouraged over discoveries in new-type structures, such as deep anticline intermediate structures in the Hanoverian salt-dome area and a stratigraphic trap in Emsland.

By far the greatest part of the proved reserves—26,700,000 tons or 73 per cent of the total—is attributed to the Emsland region. Last year's estimate for this area was 14,300,000 tons. Mainly as a result of the discovery at Suderbruch, the estimate for reserves in the Hanover district has increased by 84 per cent since last year and now amounts to 8,200,000 tons. In Schleswig-Holstein further exploration on the west flank of the Heide-Meldorf structure added to reserves. Reserves of this province together with those of the Hamburg area are placed at 1,600,000 tons. Baden has been given reserves of 40,000 tons.

MIDDLE EAST

Dollar Squeeze

Arabian American, faced with necessity for taking soft currency, to reduce U. S. personnel, spend fewer dollars

EMPLOYMENT and purchases of Arabian American Oil Co. are being shifted to non-American areas in order to make maximum use of soft currencies which the company will receive in part for its production.

This was made known last week in a letter which W. F. Moore, Aramco president, addressed to the company employes.

The company president outlined in general changes made necessary in company operations as a result of the currency situation. They were:

Personnel.—A progressive decrease in the number of American employes. At the present time, Aramco has about 2,100 Americans in Saudi Arabia. In addition, the company has 13,000 other employes in the country, including about 10,000 Saudi Arabs.

Moore said the number of Americans is expected gradually to shrink over the years as Saudi Arabs are trained to handle more responsible jobs. "Furthermore, because of the necessity of using soft currency for company payrolls, many of the Americans will be replaced over the next few years by skilled employes from soft-currency countries," Moore said.

Shipping. — Shipping in vessels of companies that will accept soft currencies for freight. Moore said foodstuffs to support the operation in Saudi Arabia will be purchased almost entirely in countries where soft-currencies can be used, and that American brands will gradually disappear from Aramco's commissaries.

Royalty.—Payments in soft currency to the Saudi Arab Government. Moore touched only briefly on this point. Aramco's royalty of about 22 cents a barrel is payable in gold or equivalent in dollars or sterling. Soft currencies could be used in its purchases of Saudi Arabian riyals.

Money shift.—Supplanting the present dollar currency system used by the company in Saudi Arabia for goods and services in favor of Saudi Arabian money. In this connection, Moore said: "Saudi Arab riyals will be used, and a fair schedule of charges and exchange rates is now being worked out.

"Existing housing, dining, and recreational facilities will be used wherever feasible for new soft-currency employes and skilled 'upgraded' Saudi Arabs as well as Americans. Privileges will be provided on a job-classification basis." Moore said employes would pay for some services now free but that allowances would be given to offset approximately the charges made.

Over-all problem. — Discussing the over-all problem faced by the company, Moore said that "Aramco's great industrial enterprise in Saudi Arabia was pioneered by Americans and financed by American dollars. Services, goods, and wages have been paid for with American dollars at home and abroad. That was because the original capital was contributed in dollars and Aramco has sold oil for dollars, using the dollars from these two sources to meet its expenses."

Moore pointed out that Aramco oil in recent months has been displaced in many markets by British produced oil selling for sterling. "It seems likely that Aramco oil will be excluded from markets in other large areas of the world as well unless corrective measures are taken. Companies which market Aramco oil have advised us that from now on they must be prepared to accept at least part payment for Aramco's oil in soft currencies—currencies not exchangeable for dollars. It follows, therefore, that Aramco in turn will have to maximize the use of soft currencies in the payment of its operating and investment expenditures."

Aramco is owned by four major American companies, Standard Oil Co. of California, The Texas Co., Standard Oil Co. (N. J.), and Socony-Vacuum Oil Co., Inc. The latter two market their shares of the production separately, while California-Texas Oil Co., Ltd., handles Eastern Hemisphere marketing for the first two companies.

Sales for local soft currencies represent a major change of policy. In addition, it is generally anticipated that some arrangement will be worked out in the current American-British oil discussions allowing American companies to accept and use sterling with limitations.

Syrian Search to End

The exploration program of the Iraq Petroleum Co., Ltd., organization in Syria appears to be in its final stages with no discovery of oil to date.

Dispatches from Damascus last week indicated the company may relinquish its exploration rights. However, it is understood that no final decision has been made, although the program is considered to be virtually completed.

I.P.C., through its associated Syria Petroleum Co., Ltd., has drilled some 11 wells in the country since the war, all of them dry. These discouraging results fail to indicate any reasonable prospect of success.

Exploration work is, however, for the moment continuing. Geophysical surveys are under way in the Abu Kemal region in the southeast part of the country, and one rig is now drilling Djibissa 3 in the northeast.

Syrian Petroleum's exploratory concession was granted in 1938 and confirmed in 1940. It called for 5 years of work in each of three zones. The first of the three zones was relinquished last year after postponement on account of the war.

Neutral Zone Survey

Arrangements have been made with United Geophysical Co. for a seismic reflection survey of the Neutral Zone in the Middle East, according to the annual report of Pacific Western Oil Corp.

Pacific Western holds a concession on Saudi Arabia's undivided one-half of the Neutral Zone and is engaged in joint operations with American Independent Oil Co., which holds the concession on the other half from the Kuwait shiekhdom.

The Pacific Western report said the first exploratory well following a gravity-meter survey went to 5,020 ft. without finding oil. The casing, set at 3,693 ft., was plugged with cement so that the well might later be drilled to a greater depth, and the rig moved to a new location 2¼ miles west.

The company said its agreement with American Independent included the drilling of four wells to be completed by June 30, 1950, at a total cost to the company of $750,000. Phillips Petroleum Co. in its recent annual report said it had as of the end of 1949 invested $4,247,077 in 28.25 per cent of American Independent common stock and that it was the largest stockholder in the enterprise.

AUSTRALIA

Deep Test Spudded

Shell Oil Co. of Australia has spudded in a projected deep test north of Roma in Queensland. Preperations for the operation have been under way for more than a year.

Shell officials in Adelaide spoke of carrying the well down to a possible 10,000 ft. Geophysical and geological work has been done in the area. Cost of the test is estimated at the equivalent of about $1,800,000.

PERSONALS

New Appointment

Scrafford is new Buckeye Pipe Line general manager

GRAYDON A. SCRAFFORD, assistant general manager of Buckeye Pipe Line Co., Lima, Ohio, has been appointed general manager of the company, and will have supervision of all field operations.

Scrafford is a veteran of the pipeline industry who has spent his entire career with Buckeye Pipe Line. Beginning with the company in 1915 as a pipe liner, he was assigned to gathering operations in southeastern Ohio.

Serving in various capacities during his employment with the firm, Scrafford at one time was pumpstation engineer and field engineer. In 1937 he was elevated to the position of foreman of gagers.

In 1942 Scrafford became assistant division superintendent, a position which he held until 1947, when he was transferred to the company's general offices at Lima as assistant general manager.

Dr. Hans E. Thalmann, formerly chief micropaleontologist for Venezuelan Atlantic Refining Co. in Caracas, has joined International Petroleum Consultants, Inc., Pasadena, Calif., as consulting paleontologist and stratigrapher. Dr. Thalman has spent 25 years in active work overseas, including Europe, Indonesia, Mexico, Ecuador, and Venezuela, for the Royal Dutch Shell Group, Standard-Vacuum Oil Co., Standard Oil Co. (N. J.), and Atlantic Refining Co.

Max Parkin has been assigned to the administrative staff of Union Oil Co. of California's Wilmington, Calif., refinery, and will serve as assistant superintendent in charge of operating and treating. He is being replaced at Cut Bank, Mont., by **Frank Lammerman,** assistant superintendent in charge of bulk-handling division at Wilmington.

Oliver G. Simpson, intermediate petroleum engineer for Sinclair Oil & Gas Co. at Oklahoma City, has been named senior petroleum engineer at Ardmore, Okla. Other production-department changes include: **Gibson S. Romberg,** division petroleum engineer at Corpus Christi, transferred to the gasoline department; **Charles J. Eskridge, Jr.,** senior petroleum engineer at Kiefer, Okla., transferred to Pampa, Tex.; **Julian M. Simpson,** junior petroleum engineer at Midland, Tex., named intermediate petroleum engineer at Delaware, Okla.; **Bill R. Roark,** petroleum engineer at Lindsay, Okla., transferred to Tulsa; **Troy C. Kadel,** assistant district foreman at Odessa, Tex., transferred to Pampa, Tex.; **Harold A. Lund,** intermediate petroleum engineer at Odessa, Tex., named assistant district foreman; **Joe Mefford,** intermediate petroleum engineer at Drumright, Okla., transferred to Corpus Christi; **Gene L. Weger,** district foreman at Midland, Tex., named division petroleum engineer at Corpus Christi; **Cameron L. Cox,** junior petroleum engineer at Maysville, Okla., named intermediate petroleum engineer; **Robert A. Bonnell,** intermediate petroleum engineer at Midland, Tex., transferred to Odessa, Tex.; **Robert R. Davis,** intermediate petroleum engineer at Corpus Christi, transferred to Midland, Tex.; and **Edward H. Whitlock,** junior petroleum engineer at Lindsay, Okla., transferred to Ardmore, Okla.

Virgil Michael recently resigned as assistant district land man for the Houston division of Amerada Petroleum Corp. to become an independent oil operator at Jackson, Miss.

Irving M. Griffin, Jr., consulting geophysicist formerly with General Geophysical Co. as seismic supervisor of the Pacific Coast and Rocky Mountain divisions, has opened consulting offices in Houston.

William E. Colson, geologist, formerly with Barnsdall Oil Co., Houston, has joined Horsting Oil Co., and will work out of the firm's headquarters at Driscoll, Tex.

Millard W. Smith, Wichita division manager for Anderson-Prichard Oil Corp., will become associated with Anschutz Drilling Co., Wichita, April 15. He has been with Anderson-Prichard for the past 21 years.

Waldo J. Johnson has been appointed process foreman in the chemicals plant section of Pan American Refining Corp.'s Texas City, Tex., refinery. Others appointed process foremen include: **Leonard W. Holder, Fred F. Hassler, Clarence A. Hassler, Ray J. Decco,** and **Melvin N. Nelson.** Other appointments include: **A. D. Scotty, Jr., H. R. Sheely,** and **W. H. Tisinger,** named assistant chemical engineers; **E. R. Arbegust, H. R. Garrison, I. H. Lutz,** and **E. A. Siegman,** named associate chemical engineers; **R. L. Aiken** and **E. R. Sadler,** named associate chemists; **Alexander McGregor, Jr., M. C. Wilson,** and **J. C. Webb,** named assistant engineers; and **E. J. Stanton,** appointed chemical engineer of the research and development department. The following were named assistant chemical and mechanical engineers: **J. W. Harrigan, Jr., L. W. Hicks, T. R. Holland, H. W. McAninch, J. R. Ross, C. R. Walton, Jr., T. P. Binder, T. M. Clapham, F. P. May, D. B. Meyer,** and **E. A. Muller, Jr.**

Robert E. Meskill, formerly in the operations analysis department of Esso Standard Oil Co.'s Bayonne, N. J., refinery, has been promoted to technical assistant in the Bayonne paraffin department. He is succeeded as group head on asphalt and distillation operations by **W. E. Borden.**

Arthur L. Kothe, Socony-Vacuum Oil Co., Inc., has been transferred from the East River refinery to the Atlas Works at Buffalo where he is now supervisor of wax and lube processes and a permanent member of the refinery management staff.

N. A. Prince, junior assistant petroleum engineer, Beeville district, United Gas Corp., has been named assistant petroleum engineer.

H. R. McFarland, vice president of Beacon Petroleum Co., Tulsa, is manager of the newly established office in Houston.

Lee R. Cowles, traffic manager for Standard Oil Co. (Ind.), has been elected president of the Traffic Club of Chicago. He is the first representative from the petroleum industry to head the club.

Leo Fortier is president of the newly organized Crest Petroleum, Inc., with offices in Wichita. Other officers include: **S. J. Buffington,** vice president; and **Wayne Wright,** secretary-treasurer.

J. K. Somerville, junior geologist, Shell Oil Co., Houston, has been named subsurface geologist and trans-

PERSONALS

ferred to Lake Charles, La., and **A. R. Newman,** exploitation engineer, has been transferred to New Orleans from Donaldsville in the same capacity.

Paul Truesdell, veteran of more than 20 years' service with Universal Oil Products Co., Chicago, as a member of the advertising and public-relations staff, has retired from the company. A group of company associates and representative members of the Chicago press honored him at a recent luncheon held at the Union League Club. Truesdell rounded out a 42-year career devoted to journalism, which began in 1908 with the Cleveland Plain Dealer. He joined National Petroleum News in 1917, and U.O.P. in 1929.

Charles R. Mooney, geologist at Lolita, Tex., for Humble Oil & Refining Co., has been transferred to Houston in the same capacity.

Ellsworth B. Zoeller, shift foreman in the pressure-distillation division, distillation and cracking department, Esso Standard Oil Co.'s Bayway, N. J., refinery, has been named technical assistant in the catalytic cracking section. Other changes include: **John Abel,** named senior shift foreman in the pressure-distillation division; and **Charles Hild,** named assistant shift foreman.

V. Robert Kerr and **R. W. Dudley,** formerly with Cummins, Berger & Pishny, have formed the oil-exploration consulting firm of Kerr-Dudley & Co., with headquarters in Fort Worth. Kerr, a graduate of the University of Colorado's School of Engineering, served 12 years with Cities Service Oil Co.'s exploration department. Dudley is a graduate in geological engineering from University of Oklahoma, and formerly was with Carter Oil Co., Humble Oil & Refining Co., and Pure Oil Co.

Jack K. Carter, Tide Water Associated Oil Co., has been appointed supervisor of bulk-oil pumping operations at the company's Bayonne, N. J., refinery, and **Harry J. Bodson** has been named foreman of bulk-oil operations.

Edward Frank Cole, rotary driller in the Baytown, Tex., area for Humble Oil & Refining Co., has been transferred to the Monahans, Tex., area in the same capacity.

Forrest L. Fry, tool pusher at Roundup, Mont., for Noble Drilling Co., has been moved to Casper, Wyo., in that capacity.

Emory Diltz, assistant geophysical computer for Continental Oil Co. at Tatum, N. M., has been moved in that capacity to the Gainesville, Tex., area.

H. G. Walter, geologist for Ohio Oil Co., with headquarters in Columbus, has been transferred to Terre Haute, Ind., as district geologist for the Appalachian basin.

C. P. Baker, district superintendent at Nordheim, Tex., for Sunray Oil Corp., has been transferred to Premont, Tex., in the same capacity.

T. G. HUGHES

G. L. PARKHURST

T. G. Hughes, executive vice president of Oronite Chemical Co., subsidiary of Standard Oil Co. of California, has been elected president of the company, succeeding **George L. Parkhurst,** has been elected chairman of Oronite's board of directors. Hughes joined California Standard in 1926, and has been with Oronite since its organization in 1943. He was named executive vice president last year. Parkhurst replaces **R. G. Follis,** chairman of the board of directors of the parent company, who remains as a director of Oronite.

E. M. Robbins, Jr., Sinclair Oil & Gas Co. geologist at Casper, Wyo., has been transferred in that capacity to the company's Billings, Mont., office.

Paul Guthrie, C. E. Mills, and **J. W. Miller** have formed the Paul Guthrie Development, Ltd., with headquarters in Edmonton, Alta., and will engage in contract drilling. **Norman McLean,** petroleum engineer, is associated with the men in Petroleum Consultants, Ltd., doing field engineering and consulting work.

Walter P. Wilson, formerly manager of operations in Colombia for Sinclair Oil & Gas Co., has been appointed vice president and general manager of Sinclair Canada Oil Co., with offices in Calgary, Alta., and will handle geological as well as administrative duties in his new position. **J. J. McRoberts** was appointed land agent in Calgary.

F. C. Beleau, formerly division superintendent for Stanolind Oil & Gas Co. in Calgary, Alta., has been named district production superintendent for the company at Midland, Tex., succeeding **Tom B. Campbell,** who resigned to enter business as a consulting engineer. Beleau formerly was with Midwest Refining Co.

Olin Culberson, member of the Texas Railroad Commission, has withdrawn as a candidate in the forthcoming Texas gubernatorial race.

F. W. Richardson has been named assistant division geologist for Humble Oil & Refining Co.'s Permian basin area, succeeding **John W. Skinner,** who is on a special research assignment in West and North Texas. **Vaughn C. Maley** is division geologist, with headquarters in Midland, Tex.

Forrest Smith has been appointed assistant general superintendent for Carl B. King Drilling Co., with headquarters in Midland, Tex.

R. W. Killen has been named district land man for the California Co., Denver, replacing **Gene Spaulding,** who resigned.

C. E. Skiles, Mount Carmel, Ill., independent oil producer, has formed and incorporated the Skiles Oil Corp. Skiles will serve as president, **V. J. Wilson** will be vice president, and **Kenneth Lindskog** will serve as secretary-treasurer.

Fred A. Bippus, formerly production manager for Indiana Farm Bureau, has resigned and is now serving as an independent operator at Evansville, Ind.

John E. Miskell, formerly with Magnolia Petroleum Co., has entered the independent field as petroleum engineer with headquarters in Mount Vernon, Ill.

R. L. Jodry has been named chief geologist for Rex Oil & Gas Co., Muskegon, Mich. He formerly was with Ohio Oil Co. at Grand Rapids, Mich., and prior to that was with Magnolia Petroleum Co. in Louisiana and Texas.

B. R. Peacock, shift foreman at The Texas Co.'s Casper, Wyo., refinery since 1946, retired recently after 27 years of service with the company.

A. J. Brown, geological scout for Shell Oil Co., has been transferred from Denver to Scottsbluff, Neb.

Ervin G. Kroker, district superintendent at Roseburg, Ore., for Kroker Drilling Co., is now serving as superintendent of wildcatting operations for the Rocky Mountain and West Coast areas with headquarters in Lebanon, Ore.

Tom Seale, chief engineer for Kerr-McGee Oil Industries, Inc., at Oklahoma City, is now in the Kuwait Neutral Zone on the Persian Gulf, where the company is drilling for American Independent Oil Co.

Russell P. Johnson, Olney, Ill., independent oil operator, was recently elected a director of the Independent Petroleum Association of America. Others elected include: **C. E. Skiles,** Mount Carmel, Ill.; **Harold L. Woods,** Monroe, La.; **F. H. Harrell,** Shreveport; **W. O. White,** Shreveport; **T. F. Grisham,** Abilene, Tex.; **Harold Decker,** Houston; **George E. Brimmer,** Cheyenne, Wyo., and **Millard G. Sinclair** and **J. D. Sanford,** both of San Antonio.

Ralph K. Davies, American Independent Oil Co., San Francisco, has been appointed a member of the National Petroleum Council by **Oscar L. Chapman,** secretary of the Interior. Others appointed include: **Warwick Downing,** independent oil operator, Denver; **James P. Dunnigan,** Producers Refining Co., West Branch, Mich.; **Harry Leyendecker,** Independent Refiners Association of America, and **Sid W. Richardson,** independent operator, Fort Worth.

SHIFTS

Warren Carlson, engineer, Standard Oil Co. (Ind.), Whiting, Ind., to Tulsa; **J. C. Cody,** superintendent, Superior Oil Co., Bakersfield, Calif., to Los Angeles; **Donald E. Koch,** engineer, Superior Oil Co., Bakersfield, Calif., to Los Angeles; **T. H. Sandoz,** superintendent, Pan American Production Co., Abilene to Snyder, Tex.; **J. W. McLaughlin,** Magnolia Petroleum Co., Kermit to Imperial, Tex.; **R. M. Bowen, Jr.,** engineer, Texas Pacific Coal & Oil Co., Seminole to Breckenridge, Tex.; **Richard F. Wilson,** engineer, Humble Oil & Refining Co., Grand Isle, La., to New Orleans; **L. E. Leflore,** engineer, Humble Oil & Refining Co., New Orleans to Brookhaven, Miss.; **H. G. Mulcahy,** engineer, Gulf Oil Corp., Port Barre, La., to Houston; **E. C. Dillard,** The Texas Co., Griffin, Ind., to Fairfield, Ill.

C. L. Franke, engineer, Gulf Oil Corp., Hobbs, N. M., to Lyons, Kans.; **Norman B. Clark, Jr.,** engineer, Coalinga to Compton, Calif.; **Edgar N. Mills,** engineer, Pan American Production Co., Bay City to Kountze, Tex.; **R. M. Albers,** engineer, Shell Oil Co., Prewitt, N. M., to Denver City, Tex.; **H. H. Haper,** superintendent, Skelly Oil Co., Velma, Okla., to Longview, Tex.; **Cyril K. Moresi,** geologist, Lafayette to Jeanerette, La.; **Loy C. Higgins,** Skelly Oil Co. Snyder, Tex., to Oklahoma City; **E. H. Vallat,** geologist, Ohio Oil Co., Calgary, Alta., Canada, to Bakersfield, Calif.; **H. Melvin Crist,** superintendent, Susquehanna Pipe Line Co., Oxford to Clarksdale, Miss.; **W. K. Rickel,** Amerada Petroleum Co., Williston, N. D., to Glasgow, Mont.

J. E. Green, engineer, Shell Pipe Line Corp., Houston to Cushing Okla.; **C. S. Allbright,** engineer, Anderson-Prichard Oil Corp., Laramie, Wyo., to Cyril, Okla.; **Danny E. Shupp,** engineer, Carter Oil Co., Tulsa to Seminole, Okla.; **Whitney J. Meaux,** engineer, Halliburton Oil Well Cementing Co., Crowley, La., to Seagraves, Tex.; **B. F. Owings, Jr.,** National Geophysical Co., Childress to Seagraves, Tex.; **William P. Harvey,** Geophysical Service, Inc., Tulsa to Crosbyton, Tex.; **R. E. Brooks,** engineer, Skelly Oil Co., Shreveport to Carthage, Tex.; **Ted Hackney, Jr.,** engineer, Gulf Oil Corp., Crane to Penwell, Tex.

Gordon S. Rohe, engineer, California Co., Waterproof to Harvey, La.; **Charles D. Geiger,** engineer, Carter Oil Co., Jackson, Miss., to Shreveport, La.; **W. L. Effinger,** superintendent, California Co., Williamsport, Pa., to Lexington, Ky.; **Ross R. Loomis,** engineer, Ajax Oil Co., Dallas, to Newcastle, Wyo.; **W. M. Miller, Jr.,** superintendent, Mercury Oil Refining Co., Marshall, Mo., to Oklahoma City; **John W. Sutherland, Jr.,** engineer, Sunray Oil Corp., Alice to Yorktown, Tex.; **K. C. Woodyard,** Continental Oil Co., Gonzales to Harlingen, Tex.; **G. H. Summers,** Continental Oil Co., Aransas Pass to Freeport, Tex.; **J. R. Verret,** engineer, Standard Oil Co., (N. J.), New Orleans to Baton Rouge, La.; **Duncan M. Smith, Jr.,** engineer, California Co., Harvey to Waterproof, La.; **Henry J. Wedig,** geologist, Kingwood Oil Co., Mount Vernon, Ill., to Evansville, Ind.; **David Johnston,** engineer, Gulf Oil Corp., Midland to Corpus Christi, Tex.

DEATHS

Donald G. Clark, 58, former director of purchases for Gulf Oil Corp., died April 9 in West Dennis, Mass. Clark, who had served as president of the National Association of Purchasing Agents, joined Gulf in 1938 and retired about a year ago.

William B. Joachim, 58, sales manager for Tide Water Associated Oil Co., with which he had been associated for more than 25 years, died April 2 in Philadelphia.

Robert A. Browne, retired official of the Pennzoil Co., died in Oil City, Pa., April 1. He formerly was with Atlantic Refining Co.

Harvey Augustus Renschler, 82, retired oil man, died in Tulsa April 10. He formerly served as field superintendent for the Tulsa district of the old Prairie Oil & Gas Co.

George Herman Collier, 45, general superintendent of M. L. Hulcher Co., Inc., and formerly with G. G. Griffis, Inc., Tulsa, died in Houston April 1.

J. A. Rowe, 59, retired purchasing agent for Humble Oil & Refining Co., died April 2 at Houston.

M. M. Barlow, 43, geologist for Chaplin Oil Co., Wichita Falls, Tex., died April 2.

J. H. Goughnour, compressor superintendent at Mullinville, Kans., for Northern Natural Gas Co., died recently. He had been with the company since 1931.

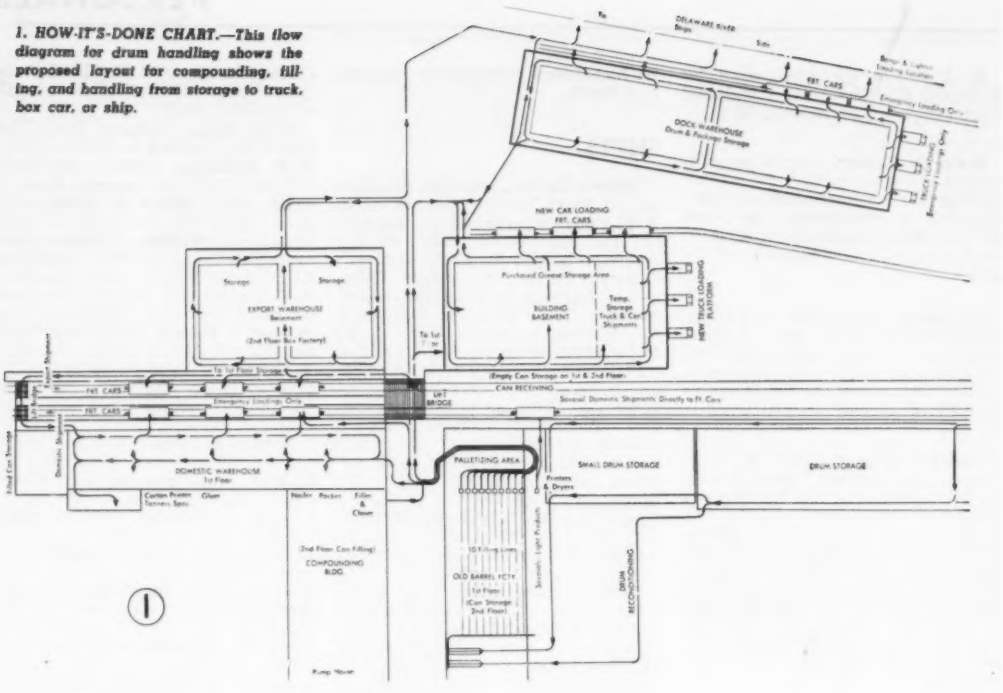
Maurice V. Rushmore, 55, geological scout for Gulf Oil Corp., died in Oklahoma City April 9.

Russell A. Keck, 48, vice president of sales for Kendall Refining Co., Bradford, Pa., died in West Palm Beach, Fla., April 1.

Jack (Carl) Livingston, 57, former Tulsa oil operator, died in New York City recently.

Howard F. Seeland, 52, a purchasing agent for Esso Standard Oil Co. in New York, died April 5 in Little Silver, N. J.

Michael Thomas Young, 40, Austin district manager for Humble Oil & Refining Co., died April 3.



1. HOW-IT'S-DONE CHART.—This flow diagram for drum handling shows the proposed layout for compounding, filling, and handling from storage to truck, box car, or ship.

Socony-Vacuum Revamps Lube-

$2,000,000 reconversion covers (1) materials handling, (2) barrel filling, (3) can filling, and (4) compounding. Nearly all manual handling of barrels and cases is eliminated, reducing manpower 43 per cent.

by George Weber
Refining Editor

A COMPLETE revamping of compounding and packaging facilities is under way at Socony-Vacuum Oil Co., Inc.'s, Paulsboro, N. J., refinery. By application of sound engineering studies and adoption of modern machines and methods, the company anticipates a substantial improvement in the efficiency and flexibility with which refinery stocks may be compounded, packed, and shipped.

The Paulsboro plant, built in 1916-1917, has specialized in the manufacture of lubricants and other packaged petroleum products for foreign and domestic markets. The original packaging department has coped with a continuous expansion both of volume and number of products. In 1948, a total of approximately 1.5 million barrels of special products, representing 365 formulas or 900 brands, was compounded in batch tanks, packaged, and shipped through the department. This volume comprised approximately 900,000 55-gal. drums and 2.4 million cases containing over 15,000,000 cans, about 75 per cent of which moved to export markets. In addition to bulk fuels loaded to tank cars, tank trucks, and barges, the refinery dispatched packaged goods on 153 ships, 308 barges, 1,726 box cars, and 5,111 trucks.

In the early postwar period, continued diversification and anticipated volume increase in products dictated that drastic changes be planned for the packaging department. An engineering study of all compounding and packaging operations was conducted in 1946. Substantial revisions were recommended in: (1) materials handling, (2) barrel filling, (3) can filling, and (4) compounding. Complete physical revamping of the department was ordered and two engineers were assigned to study and plan the modern plant.

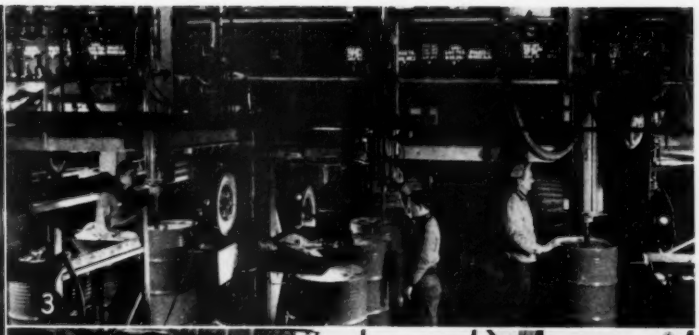
Flow sheets for fluids and materials were drawn up. Production lines were laid out on paper for filling several sizes of barrels, pails, and cans. Abandonment of can manufacture in the plant, and standardization of container sizes were recommended. Principles of methods engineering were applied in time studies, man-machine studies, and determinations of storage and space efficiency. Reconversion of the department which may cost $2,000,000 is now over half completed.

Materials Handling

The engineering study revealed that the greatest efficiency improvement would result from a revision of materials-handling methods. In shipping operations alone, a 43 per cent reduction in manpower requirements is estimated as possible through elimination of nearly all manual handling of barrels and cases.

In the new plant, conveyor systems will be employed at all filling operations and for all point-to-point movement of packaged items. Empty packages are fed to filling lines on live

2. FILLING STARTS.—The filling operator centers the drum under the filling device, and presses a button. The operation then continues automatically; volume is controlled by scale and no-drip nozzle is retracted.



3. SIX TIMES FASTER.—On the new drum-filling lines, substitution of pressure flow for gravity flow has speeded the filling operation almost sixfold. The manifold board above allows rapid switching in products.

4. RAILLESS RAILROAD.—Tractor trains are used for moving filled drums from barrel-filling lines to dockside loading points. These are loaded and unloaded by fork trucks equipped with drum-grab attachments.

Packaging Facilities at Paulsboro

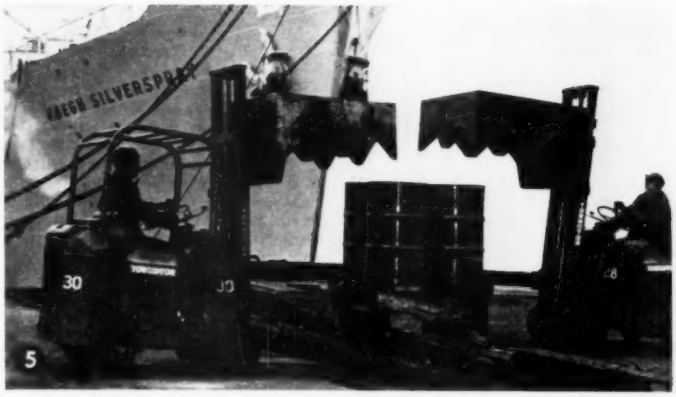
roller conveyors. Obsolete conveyors handling drums on their sides are being replaced with new live roller conveyors on which drums travel upright. Both length of travel and travel time on the new conveyor systems have been reduced.

At storage and shipping terminals of conveyor lines, pails, cartons, and cases will be palletized and moved by fork trucks or tractor-trailer trains. For ship loading, case goods remain palletized in the dock warehouse and in transit to the ships' holds from which pallets are returned to the dock.

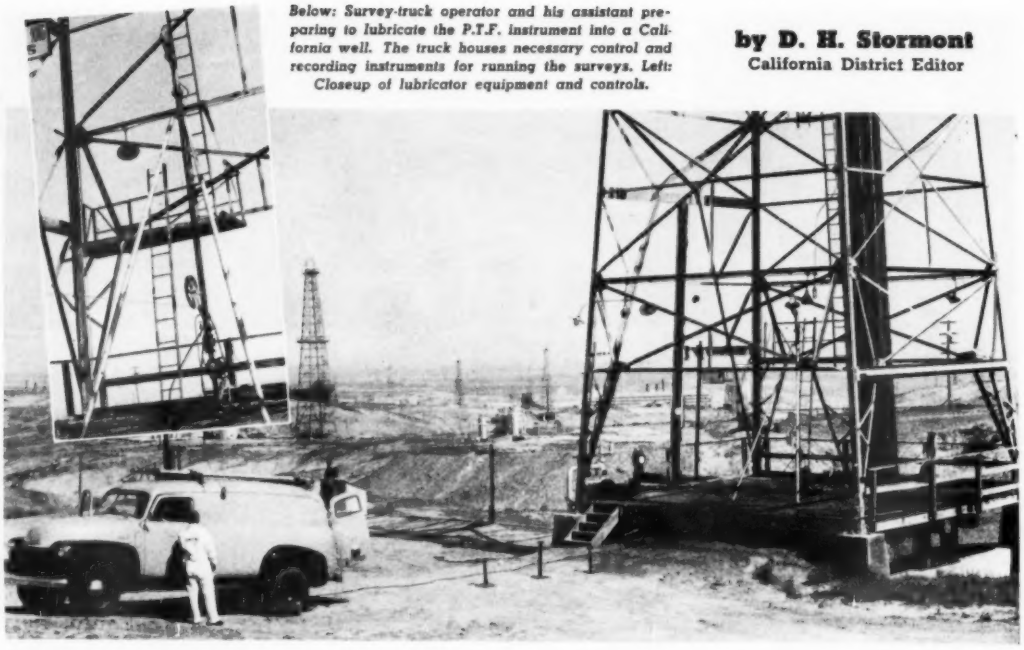
Many shipments are moved by lighter from Paulsboro to nearby Philadelphia for ship loading. A crane attachment on one of the fork-truck units allows transfer of one or more fork trucks aboard a loading lighter. Two lift trucks, one aboard the lighter and one on the dock, can thus transfer palletized loads directly regardless of tide level. Cases remain on pallets until stowed in ships' holds, and pallets are returned by lighter to the company dock.

For handling filled barrels, studies revealed that the use of drum grab attachments on fork trucks will effect a marked saving over the former use of heavy pallets. Filled drums from the new experimental filling lines are picked up in lots of four and loaded

(Continued on page 111)



5. MECHANICAL HANDS LOAD QUICKER, SAFER.—This shows two drum-grab trucks exchanging a load of four barrels going aboard a lighter. When packaged goods are loaded, two fork trucks without drum-grab attachments, exchange pallets direct. This can be done at varying elevations of lighter deck, while drum loading requires that the deck be nearly level with the dock.

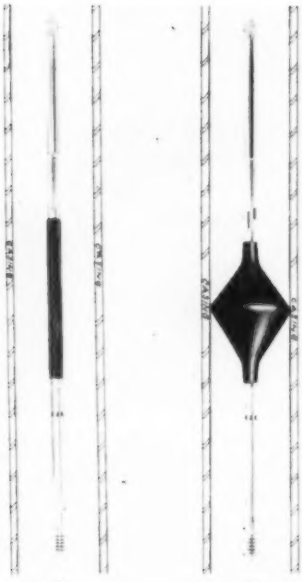


Below: Survey-truck operator and his assistant preparing to lubricate the P.T.F. instrument into a California well. The truck houses necessary control and recording instruments for running the surveys. Left: Closeup of lubricator equipment and controls.

by D. H. Stormont
California District Editor

Subsurface Pressure-Temperature-Flow Conditions Recorded on a Single Run

. . . by Use of a New Survey Tool



(A) (B)

Fig. 1—When the packer is collapsed (A) the new tripurpose tool can be run through tubing as small as 2 in. o.d.; when expanded (B) the packing element serves to bypass fluid through the packer.

A THOROUGH picture of oil reservoirs, insofar as pressure-temperature-flow conditions are concerned, is developed when these data are obtained on a single run and at several production rates, with definite correlation between the curves. A tool capable of providing such insight recently was introduced and is steadily gaining acceptance in California well-performance and reservoir studies.

The unitized instrument used to survey pressure - temperature - flow conditions can be lubricated through tubing as small as 2-in. o.d. An expandable-collapsible packer, capable of being extended to a diameter of 7 in., is incorporated in the tool so that dependable flow conditions can be obtained.

Only recently introduced to the industry, the tool enables the engineer to observe P.T.F. conditions at any number of oil-producing zones and at an unlimited number of producing rates—all on a single run. As all three indications are taken in rapid sequence an accurate picture of well conditions for each flowing rate is shown. Through observing the indicated measurements, relative rates of production from individual zones can be established, points of gas or water entry can be located, and extensive data on each pay's performance can be determined.

Having this knowledge the engineer then can make decisions which will result in more efficient recovery of oil. For example, by studying the plotted flow and relative density curves he can quickly recommend optimum rates of production for individual pays. Or the data may point to the need for isolation from the well bore of some low-pressure, almost depleted zone; need for remedial work to shut off gas or water pays likewise may be indicated.

The new instrument, manufactured by Byron Jackson Co., was developed

by B.J. research engineers primarily for use in surveying wells with extremely thick producing sections. In many California fields where several hundred feet of oil formation may be produced through one well bore, some of the individual sands are nearing depletion. Through use of P.T.F. surveys the relative productivity of individual sands can be determined and the rate of production from each regulated accordingly.

The complete instrument is 1½ in. in diameter and 9½ ft. long. It is lowered into the hole on a 0.175-in. amergraph oil-well cable through a lubricator containing a packing gland of special design. Sufficient weight bars are added below the instrument to assure its readily being lowered to the desired depth. The tool has been lubricated into wells with surface pressures as high as 2,500 psi.

When the tool has been spotted at the desired depth, and below the tubing string, the bypass packer is expanded. This is accomplished by exploding an electric blasting cap in a detonating device below the packer. The action of the explosive charge releases a trigger, which normally holds the packing element in its collapsed position, so that the packer is free to expand up to its maximum diameter of 7 in.

The packing elements press against the walls of the casing with sufficient pressure to divert most of the fluid flow, but do not press so hard that the tool cannot be freely raised or lowered. Views of the bypass packer in collapsed and expanded positions are shown in Fig. 1.

When P.T.F. conditions have been checked at as many points and flow rates as is desired, the tool is raised to the bottom of the tubing string. Upon contacting with the tubing, a slight pull on the cable results in the leaves springing back to their collapsed, original position of 1⅜-in. diameter.

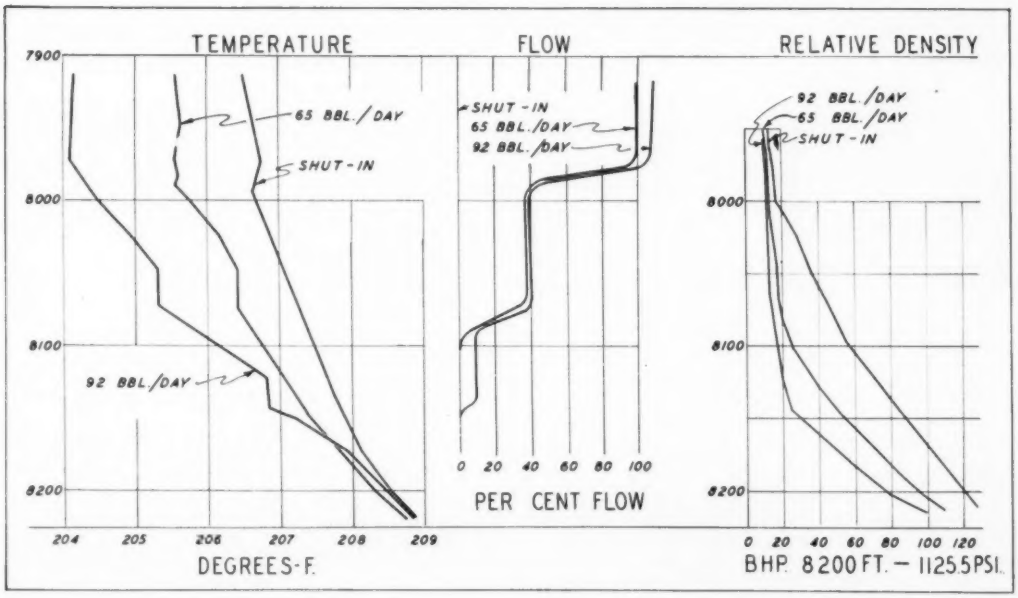
The pressure - temperature - flow measurements taken at each level and rate of flow are telemetered to the surface and shown on indicating instruments mounted in a panel truck (see Fig. 2). From these recorded indications, plots then can be made to give a more graphic record of the survey. Graphs resulting from the P.T.F. survey of one California well are shown in Fig. 3.

Highly accurate measurements of temperature and pressure are obtained through use of the variable frequency, electronic-type instruments employed. Pressures can be determined to 1 lb. in 6,000 psi. and temperatures to one-thirtieth of a degree Fahrenheit. Dependable flow indications are assured through use of the bypass packer assembly and flow meter.

The extreme accuracy obtained is made possible by the characteristics of the sensing elements used. The pressure, temperature, and flow vary the frequency output signal of the sensing elements and this change of frequency is measured at the surface to an accuracy of 1/10,000. The pressure element is temperature compensated. The temperature element has an average thermal lag of 5 minutes, but since temperature changes are observed at the surface complete thermal equilibrium is assured.

Fig. 2 — Pressure-temperature-flow readings taken in the hole are telemetered to the surface where they are shown on the instrument panel of a survey truck.

Fig. 3—Typical plots obtained from a P.T.F. survey in a California well. Note in the temperature survey that at a production rate of 65 bbl. daily, only the 7,950 to 8,060-ft. interval produced. Production is indicated by vertical or near vertical section of the temperature curve. When the back-pressure was reduced the 8,135-ft. sand starts flowing to increase the production rate to 92 bbl. per day. In the plot showing flow conditions, the percentage flow from each sand is indicated and correlates with the temperature indication of flow. Production from each horizon varies the density curves and thereby indicates the type of production that is being contributed.



Offshore Seismograph Work

. . . with a single boat

by Charles J. Deegan*
Associate Editor

FROM the very beginning of offshore seismograph work in the Gulf of Mexico, it has been apparent that loss of working time due to rough weather was one of the main items in running up costs. Increasing the size of boats used was one obvious way to overcome this, since the larger the boat, the less effect bad weather had. But as long as surveying and other problems required the use of more than one boat, there were definite economic limits to increasing the size of the boats.

On the other hand, devising a system for using a single boat brought on problems that required developing new seismic equipment, as well as a new surveying system. Marine Instrument Co., of Dallas, after considerable experimenting, developed new seismic equipment, a new surveying method, and operating techniques that brought the results shown in the box accompanying this article.

One of the first problems encountered in using a large boat is that it is undesirable and uneconomic to stop while shooting. Therefore, the seismic detectors used must operate while the boat is in motion, and must withstand

*Based on paper first delivered before regional S.E.G. meeting in Dallas by L. C. Paslay.

PRODUCTION RESULTS — ONE-BOAT OFFSHORE SEISMOGRAPH SHOOTING

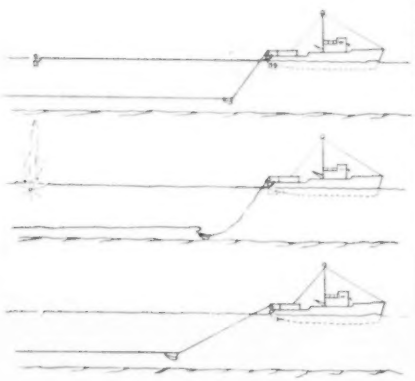
Results: 600 to 650 miles continuous line seismic profile per month.
Area of prospects: From Mississippi delta to below Freeport, Tex.
Operating base: Galveston, with occasional stops at Freeport and Cameron for supplies.
Operating schedule: 5 days in port, 10 days out; in longer days of summer, 6 days in port, 9 days out; schedule 210 working hours per month.
Recent months—actual time breakdown:

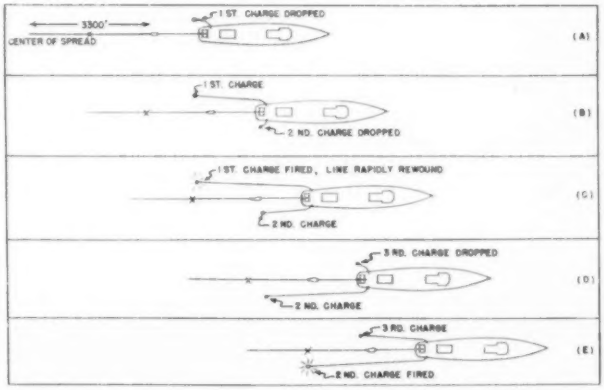
12	days shooting
3	days surveying
2	days running time out of port
1½	days experimental work and breakdowns
½	day average loss account bad weather
19	days total working time

DATA ON THE BOAT USED

General type: Former Navy patrol.
Size: Length 138 ft. over-all; beam 24½ ft.; 250 ton; loaded draft 9 ft.
Power: Two 500 hp. diesels; three auxiliary power plants of 10, 30, and 60 kw. respectively.
Other equipment: Gyro compass, automatic pilot, fathometer, radar, and complete radio equipment, sea-water distiller in addition to usual fresh-water tanks.
Living quarters: Twelve double staterooms, separate toilet facilities for each group of three; steam heat and forced-draft ventilation to every space in ship under all weather conditions.
Operating capacity: Will carry all supplies except explosives, for 45 days' operation. Below-deck explosives magazine capacity, 36,000 lb.

Fig. 1—(Left) Schematic diagram showing in three stages what happens as shot is fired. Upper, shot floats on top of water, seismometer hose floats under water, held parallel with bottom by hydrofoil. Middle, towing cable from ship to hydrofoil is slackened, hydrofoil sinks toward bottom, and seismometer hose slows down momentarily, as shot is fired. Lower, towing cable immediately tightened and seismometer hose continues to follow ship. Fig. 2—(Right) Diagram showing how shots are fired alternately from opposite sides of boat, for continuous shooting while boat is in motion.





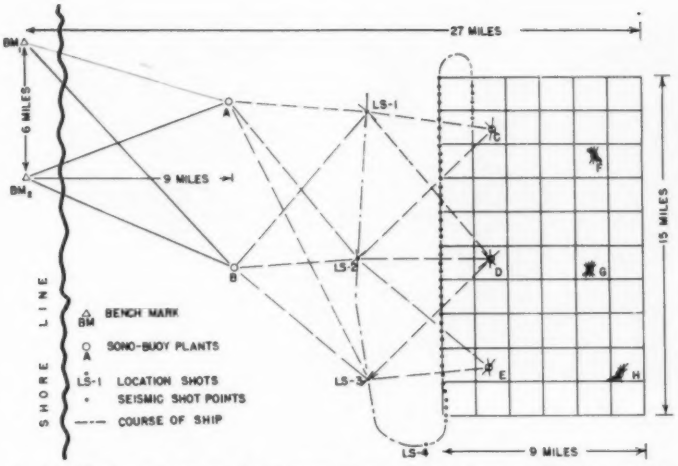


Fig. 3—Plat showing how use of sonobuoys permits surveying in all positions beyond "A" and "B" by firing location shots in the water. "A" and "B" are sighted in by transit from known shore locations.

continuous towing at normal boat speed; yet must be capable of being pulled on board quickly in case of stormy weather.

This was finally solved by using a piezo-electric-crystal-type detector instead of the conventional seismometer, and placing the crystals at intervals inside an oil-filled $1\frac{3}{4}$-in.-diameter plastic hose. The hose is made up in 300-ft. sections, each section giving one trace on the seismograph record. The crystals are spaced about 6 ft. apart, beginning about 25 ft. from each end of the hose. Thus there are 40 crystals in each section of hose, with about a 25-ft. blank portion at each end.

In most of the area shot, 8 to 10 trace records were used. If an eight-trace record was being shot, four sections of crystal-filled hose were coupled together, then a 300-ft. blank section coupled into the center, then four more crystal-filled sections coupled on. The shot is always fired opposite the dead 300-ft. center section.

All sections of hose are filled with oil under pressure, and the weight calculated so that each section is neutrally buoyant to about one-quarter of 1 per cent. Because of this buoyancy factor, when towed the hose will tend to remain at any given depth indefinitely. It will withstand the explosion of a 17-lb. shot at 15 ft.

The record from this type of detector is acoustically essentially the same as that from a moving coil seismometer firmly planted on hard bottom. The long (approximately 250 ft.) continuously sensitive interval materially cleans up the record as a result of marked reduction in random disturbances. In some areas of soft bottom, the hose-type detector gives improved records over those obtained by conventional seismometers planted on bottom.

Operating Technique

Fig. 1 is a schematic diagram showing the boat on the right, and a towing cable leading from the stern of the boat down to the hose-type detector. At the junction of the towing cable and the detector, a heavy hydrofoil called a depressor is attached; the detector hose streams back from the hydrofoil. Not shown in the diagram is a drogue at the far end of the hose detector, which keeps the back end within a few feet of the bottom. Just prior to the shot, the towing-cable reel is released, the depressor hydrofoil sinks to bottom, and the detector hose spread slows down. Immediately after the shot, the towing cable is again tightened.

Fig. 2 is a schematic diagram showing how a system of continuous shooting is carried on while the boat is traveling at a steady speed of 6 to 7 m.p.h. Two firing lines are carried on power-driven reels, one on each side of the stern. The lines consist of

(Continued on page 112)

Fig. 4—(Left) Closeup of reel of hose-type seismometer used. Fig. 5—(Right) Single-boat seismograph unit showing shot fired while boat continues traveling steadily on course.

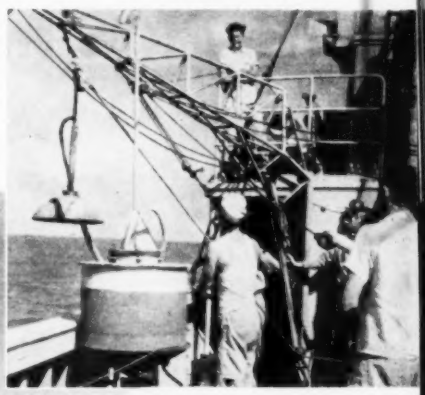
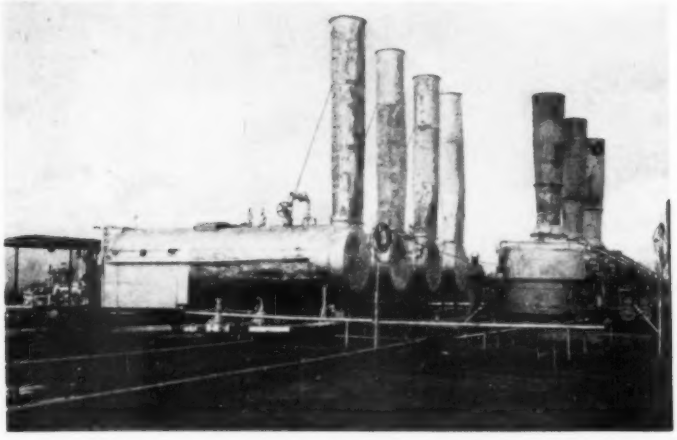


Fig. 6—(Above) Last stage of picking up a sonobuoy which is to be moved to a new location.

Right: This heavy-duty steam rig of Magnolia Petroleum Co. was the site of a 90-day field test on the new coil-type water-tube boilers. The location was a 14,000-ft. wildcat in St. Landry Parish, South Louisiana. Above: Daylight tour on the Magnolia rig includes Willie F. Garner, Joe Dorsey, William T. Adams, Benny C. Rogers, S. A. Warren, and Worley Broussard, tool pusher.

Big Steam Rig on 14,000-Ft. Magnolia Well Runs 90-Day Test on Water-Tube Boilers

by Leigh S. McCaslin, Jr.
District Editor



Three of the coil boilers were placed in use along with four 150-hp. standard oil-field fire-tube boilers. Two of the coil boilers carried the load while drilling was under way, as compared to four standard boilers.

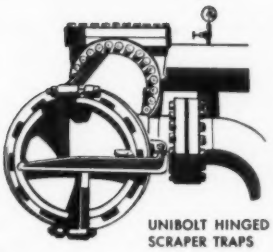
A 90-DAY field test has been completed recently on a 300-hp. coil-type water-tube boiler designed specifically for oil-field use. The new unit may help arrest the trend of recent years toward power drilling rigs which has been noticeable even in the traditionally steam country of the Gulf Coast.

A vertical-type steam engine is now under development, which the boiler manufacturer* hopes to couple with its unit. This high-speed steam engine for drilling, draw works, and mud pumps will be designed to gain higher operating efficiency by utilizing the high pressures and temperatures which the coil boiler can generate. Thus, a power rig could be converted to steam by replacing the engines with coil boilers and the contemplated high-speed steam engines. Such a combination, it is expected, will make a steam rig equally portable, pound for pound, as power.

The 90-day field test on the coil boiler was run on the Magnolia Petroleum Co. 1 Rozas, a wildcat well (14,000-ft. test) in St. Landry Parish, South Louisiana. Three of the coil boilers were placed in operation along with four 150-hp. standard oil-field fire-tube boilers. The heavy steam rig, which was drilling below 12,000 ft. at the time this article was written, has three 20-in. mud pumps, a 14-by-14-in. draw-works engine, and a 12-by-12-in. rotary engine. For drilling, two 20-in. pumps have been compounded on the hole and the other 20-in. pump used on the mud pit.

Average steam demand during the test period was 36,300 lb. per hour.

*Bettis Corp., Houston.



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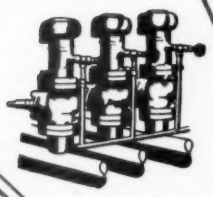
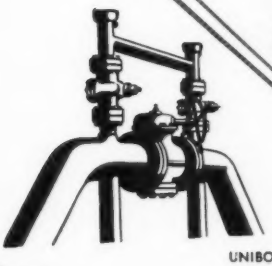
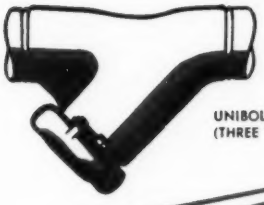


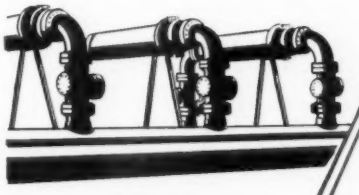
UNIBOLT COUPLINGS WITH BLANKING PLUGS ON TERMINAL MANIFOLDS



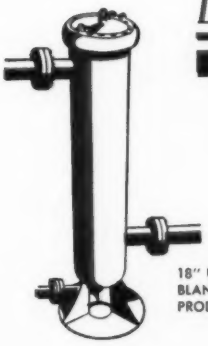
UNIBOLT COUPLINGS WITH BLANKING PLUGS ON GAS LINE BLOWDOWN



UNIBOLT STRAINERS— (THREE TYPES)



24" UNIBOLTS ON MAIN LINE GAS SCRUBBERS



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On any pipeline connection where flanged unions or closures are now used, a UNIBOLT Coupling can be employed to real advantage.

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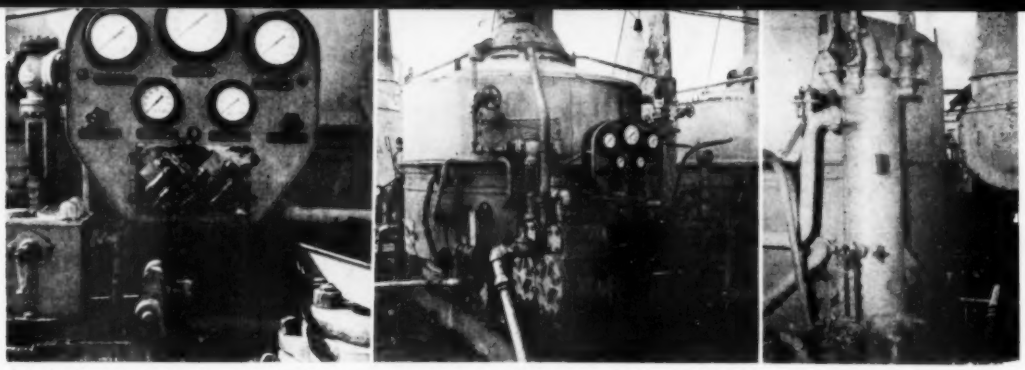
Two, UNIBOLT provides a more convenient connection or closure because of its time-saving design and blanking plugs which are available with a hinge to facilitate opening and closing.

Three, UNIBOLT provides a light-weight, less bulky unit which is economical, completely salvageable and interchangeable.

Presented here are the most common uses of UNIBOLT Couplings and blanking plugs in pipeline service. Complete details on each product will gladly be sent on request. Inquiries are invited on special pipeline manifold fabrication service.

THORNHILL-CRAVER CO.

HOUSTON UNIBOLT THE ONE BOLT COUPLING **TEXAS**



Left: In this shot of the control panel of the new boiler, the housing has been removed so that the main control can be seen. It is designed to alter the fire in direct proportion to the quantity of water entering the boiler. The control consists of two diaphragms linked together and to an arm which operates a small bleed valve. Center: In this front view, the control panel and the steam-driven boiler feed pump can be seen. Note that the boiler unit is skid mounted for portability and quick rig-up time. Right: A steam separator is a part of the complete boiler unit which consists of the boiler, steam-driven boiler feed pump, gas or oil burner, the separator, and necessary accessories and controls.

Two of the coil boilers carried the load while drilling, as compared to the four standard boilers. Only one coil boiler was required to go in the hole, but all three were required to come out of the hole. Three boilers were necessary for coming out because of the large volume of steam required by the 14 by 14-in. engine at high speed with a heavy load.

The coil boilers operated at 75 to 80 per cent efficiency, as contrasted with 60 to 65 per cent for the standard (heavily insulated) boilers. Further, the coil boilers used 20 per cent less gas than the standard units. The boilers averaged about 20° of superheat during the test. (The manufacturer believes that fuel savings would be 30 per cent on unlagged boilers. Also, if more superheat could have been used safely, a greater savings would have resulted.)

The coil boiler unit is gas fired, has gas pilot ignition, and a steam-driven boiler-feed pump. The stack draft is induced by steam jets placed in the stock. Once started, the unit is completely automatic in operation. It has a rated output of 10,000 lb. of water evaporation per hour with a 20,000-lb. overload capacity.

The complete boiler unit is comprised of a coil-type boiler of fabricated construction, a steam separator, steam-driven boiler-feed pump, gas or oil burner, and all necessary accessories and controls. These accessories and controls include a gas-pressure regulator, diaphragm gas-burner control valve, diaphragm steam-pump control valve, master boiler control, steam temperature-limit control, safety valves, heat exchanger, and pressure gages. The boiler is unitized and skid-mounted so that it is necessary only to lay the gas, water, and steam lines to get into operation.

Basic data on the unit are as follow:

Weight.—18,500 lb. includes skids, stack, feed pump, burners and controls). By contrast a 150-hp. conventional boiler weighs approximately 40,000 lb. stripped. A boiler-feed unit, designed to supply three or four conventional boilers, weighs approximately 18,000 lb.

Dimensions.—8 ft. wide, 15 ft. 2 in. long, and 8 ft. 1 in. high with stack removed.

Maximum output.—20,000 lb. of steam per hour (at maximum pressure of 500 psi. and up to 500° F. temperature).

Tubing.—Chrome molybdenum.

Boiler.—Equipped with five separate coils consisting of one water wall, an outer, intermediate, and inner conical coil, and one drying coil; a total of 1,827 ft. ranging from 1¼ to 2 in. in diameter, and having 971 sq. ft. of heating surface. Designed for 600 psi. working pressure and 700° F. total temperature.

Controls.—Water control—Vapor Clarkson. Gas control—Standard diaphragm-type pressure regulators. Steam temperature limit—Vapor Clarkson.

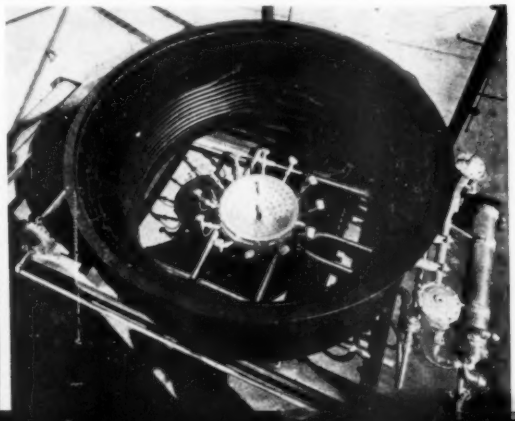
Boiler-feed pump.—Standard 10 by 5 by 10 relined to 10 by 3½ by 10. Burner—Beck Mello-Blu lesigned for 4 psi. gas pressure, or a Vapor Clarkson oil burner.

The Vapor Clarkson oil-burner design is unique in that it requires no firing target. It consists of 12 heads and a pilot, each having three inner-mix, steam-atomized nozzles. The entire assembly is built into a manifold which is interchangeable in the coil boiler with the gas burner. Like the gas burner, the oil burner is also upfired. It can burn Bunker C or lighter fuel with complete combustion. Oil-consumption tests are being correlated at this time.

During field tests, one of the tubes in the boiler was intentionally pressure ruptured to prove its safety from explosion hazard. The rupture resulted in the burners being flooded with water, but no other harm was done to the boiler. As compared to standard boilers, the coil boiler has much less water in the unit at any one time. Hence, there is no danger of explosion because of lack of water. Also, there are no parts of the coil boiler itself under pressure except the tubing.

Because of the safety angle, the boiler may prove well adapted to

Left: Frank Richards, vice president, Bettis Corp., discusses the field test with oil-company engineers at the South Louisiana well site. The men are: Karl Kretchmar, Socony-Vacuum Oil Co., Inc.; C. E. Rabb, Magnolia Petroleum Co.; R. L. (Red) Foster, Socony-Vacuum; Richards; and W. B. Colvin, Magnolia. Right: This Vapor Clarkson oil burner is a recently designed unit for use in the Bettis coil boiler. It is interchangeable in the boiler with the gas burner. It is unique in that it requires no firing target.



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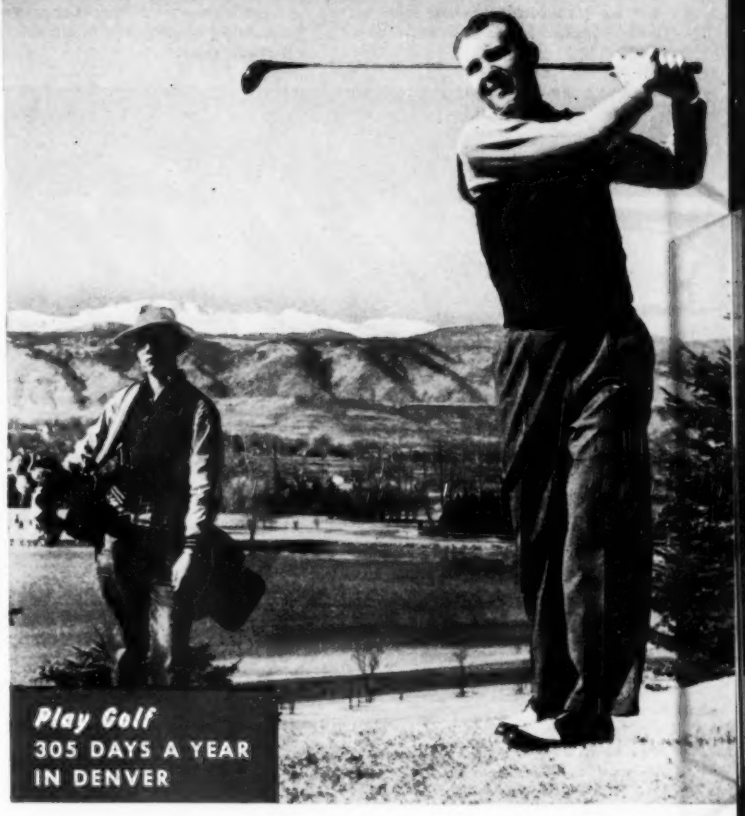

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- Convenient interrelations between oil companies—most of whom are located here.
- Good supply of intelligent help at fair wages.
- In the middle of vast new oil areas—containing the greatest percentage of recent discoveries in the United States.
- Fine schools—modern housing—and a variety of unexcelled recreational facilities for all ages.

(Write Carl E. Berg, Industrial Director of the Denver Chamber of Commerce, for a copy of the booklet "You Really Live in Denver," and for specific details on how your business could move to Denver.)

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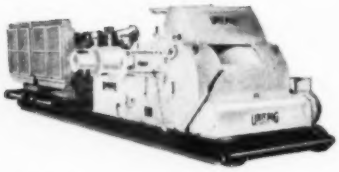
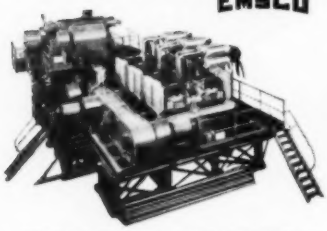


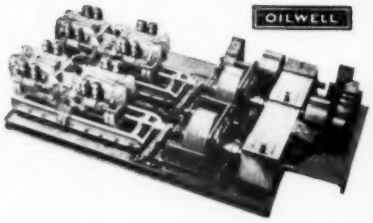
UNIT RIG & EQUIPMENT COMPANY Model U-15 powered with two General Motors Diesel "Twins."

EMSCO



EMSCO DERRICK & EQUIPMENT COMPANY'S Type J drilling rig powered by three General Motors Diesel "Quads."

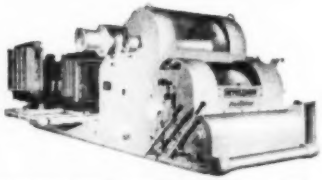
OILWELL



OILWELL SUPPLY COMPANY No. 1500 Dual Pump Drive powered with two General Motors Series 71 Diesel "Quads."

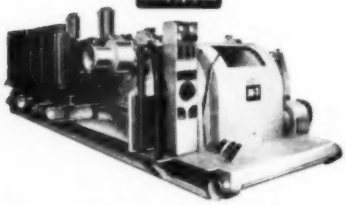
GM Diesels

BETHLEHEM



BETHLEHEM SUPPLY COMPANY "Whirlwind" Hydro-drive drilling unit with upper drum, powered by GM Diesel "Twin" and single six.

BREWSTER



THE BREWSTER COMPANY N-7 drawworks with two GM Series 71 Diesel "Twins."

Leading manufacturers of drilling rigs offer General Motors Series 71 Diesel engines as power for their equipment.

These tough, dependable 2-cycle Diesels pack more power in less space. They start easily—pick up under load fast—fit within road width—*and are backed by General Motors' world-wide service facilities.*

Available through oil field equipment manufacturers and supply stores everywhere.

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of 24-page illustrated catalog describing "The NEW General Motors Diesel Engine-Torque Converter Unit."

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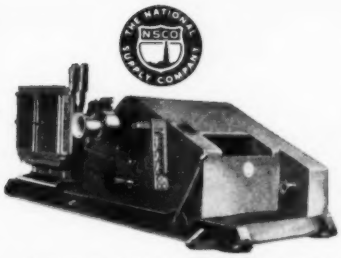
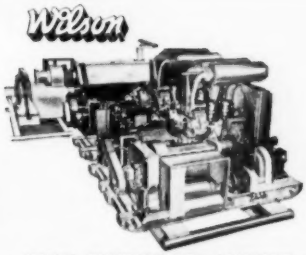
SINGLE ENGINES...*UP TO 275 H. P.* **DETROIT 28, MICHIGAN** MULTIPLE UNITS...*UP TO 800 H. P.*

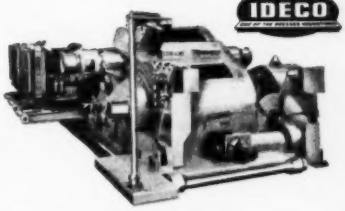
GENERAL MOTORS



NATIONAL SUPPLY COMPANY'S new T-16 Consolidated rig takes a GM "Twin 6" Torque Converter unit with pump drive or "Twin 4" without pump.

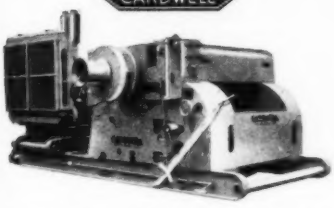


WILSON MANUFACTURING COMPANY'S Giant Torcair rig using two GM Series 71 "Twins."

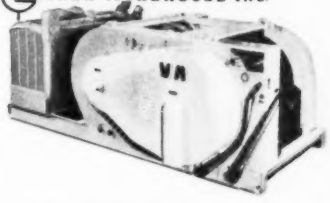


INTERNATIONAL DERRICK & EQUIPMENT COMPANY'S Hydrair 7-11 rig powered by two GM "Twin" Diesel Engine-Torque Converter units.

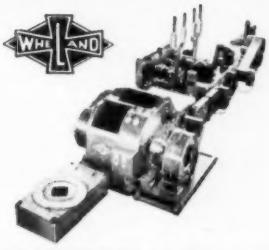
Power your Favorites



CARDWELL MANUFACTURING COMPANY Model L drawworks powered with a GM Diesel "Twin 4" Torque Converter unit.

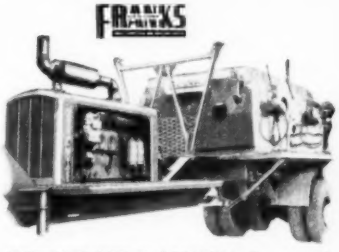


WAGNER-MOREHOUSE INC. Model 1540 double drum well servicing hoist with 6-cylinder GM Series 71 Diesel engine.

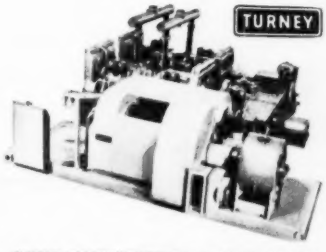


WHELAND COMPANY'S B-85 drawworks powered by two Series 71 General Motors Diesel "Twins."

GEORGE E. FAILING SUPPLY CO. portable Model 1500S equipped with GM Diesel engine.



FRANKS MFG. CORP. Model 65 DTD trailer-mounted drilling and work-over unit with GM Diesel Engine-Torque Converter unit.



TURNEY MANUFACTURING & ENGINEERING CO. Model 1250 drilling rig with two GM Diesel "Quads."

GM
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Diesel Brawn without the Bulk

TABLE 1—GAS-CONSUMPTION DATA

Gas pressure, pounds	3.8	5.8	8.2
Steam pressure, pounds	390	390	390
Feed-water temperature, degrees	95	100	105
Stack temperature, degrees	590	590	715
Flue temperature, degrees	590	670	700
Steam discharge temperature, degrees	460	458	455
Blower pressure, pounds	90	175	210
Water evaporated to steam per hour, pounds	15,000	16,400	20,300
Cubic feet per hour	20,000	24,000	29,000
CO_2, per cent	9	10	8
B.t.u. per hour based on 1,070 gas	21,400,000	25,700,000	31,000,000
B.t.u. transfer to water per hour	17,100,000	18,700,000	23,200,000
Over-all efficiency, per cent	72	73	75

foreign operations. Nationals, who are unfamiliar with steam equipment, can learn to operate it with little chance of bodily injury.

A number of controls have been installed on the boilers to make possible automatic operation. A pressure-operated valve is in the steam line to the feed-water pump. This is an automatic throttle arranged to close when the boiler pressure increases above a predetermined setting, and to open when the pressure drops below this point. Thus, as the demand increases the pump speeds up, supplying more water to the boiler, which, in turn, makes more steam, building up the pressure until a balance is reached.

The main control on the boiler is designed to alter the fire in direct proportion to the quantity of water entering the boiler. Once the proper proportion is set, control automatically maintains fuel-to-water ratio.

The main control consists of two diaphragms linked together and to an arm which operates a small bleed valve. One of these diaphragms is actuated by the difference in pressure across an orifice in the feed-water line, the other by the difference in pressure across an orifice in the fuel line. The water diaphragm is arranged to close the bleed valve when water is pumped into the boiler. The closing of the bleed valve allows the pressure to build up in the control line, opening fuel value to burner.

When the proper amount of fuel to evaporate that amount of water passes the orifice in the fuel line, the fuel diaphragm of the control opens the bleed valve just enough to modulate the fuel valve and maintain the correct fuel to water ratio. Thus any change in steam demand changes the pump speed, which in turn varies the water entering the boiler. The control then adjusts the fire for that amount of water. If no water flows, no fuel flows so the control also acts as a safety low water cutoff.

Means for lighting the burner are provided in order to get steam to start the pump, from water already in the coils. After enough steam to run the pump is generated, the main control takes over and the boiler is then fully automatic.

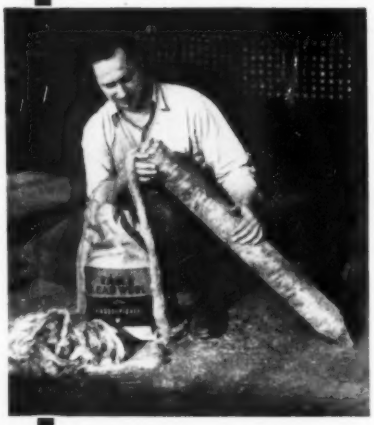
A second bleed valve in the control line is actuated by a thermostat in the steam outlet pipe ahead of the separator. This thermostat is set to open the bleed if the steam temperature should exceed a predetermined point, usually a few degrees above the saturated steam temperature. It can, however, be used as a superheat control if it is desired to furnish superheated steam. For saturated steam it is only used as a safety device in case of misadjustment or failure of the main control.

On the 90-day field test, the boiler feed water was not treated. The manufacturer believes that tube scale will not be a major problem because of the velocity of the water and steam. The boilers are acid-washed periodically, and a method has been devised to shot blast the tubes to break up and remove the scale. The structural characteristics of the coil boiler eliminate the possibility of caustic embrittlement.

From a field test on one coil boiler made prior to the 90-day Magnolia run on three units, the consumption data in Table 1 were obtained.

Eagle-Picher Lead Wool

Stops bottom water



Prevent costly shutdowns, keep bottom water out of your wells, with effective, economical Eagle-Picher Lead Wool. The fine, flexible strands fill cracks and crevices with a permanent, non-corrosive seal . . . save you time and money. Packed in convenient 50-pound sacks — easy to place in special cartridge-shaped Eagle-Picher Wire Containers sized to fit all casings. Order through your jobber.

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2. **Outlasta** — for medium speed and average-load conditions.
3. **Durable** — for low speed and light-duty conditions.

OPERATING COSTS REDUCED 37% by *Free Pumping!*

CASE HISTORY

Well No. 19 DOMINGUEZ, CALIFORNIA

CASE HISTORY

Cost Records of Two Lease Wells Covering Identical Production Periods

What it means in reduced operating costs to have the bottom hole pump available by the turn of a valve is shown in the records of these two Dominguez wells; one rod pumped and the other Free Pumped. Pumping conditions were similar. Volume of fluid lifted was almost identical. Both had the same careful supervision.

Under these conditions, considered comparable by the operator, Free Pumping put oil in the tanks at *two-thirds* of the cost of operating the rod pump.

OPERATING DATA

	Well 22 Rod Pump	Well 19 Free Pump
Depth	4100 ft.	3829 ft.
Period Covered	39 mos.	39 mos.
Total Pull Jobs	3	3
Pulling and Repair (Cost/B)	1.77¢	1.11¢

You set the stage for lower operating costs whenever you convert to *Free Pumping*. The saving in pulling costs is only one of the big advantages you enjoy. You eliminate downtime losses because there is no waiting for equipment. No rigging up or tearing down time. No long delays due to weather or road conditions. One man alone can surface, change and run the bottom hole *Free Pump*.

Paraffin control—another big expense in some fields—is reduced to a routine, low-cost operation with *Free Pumping*.

For every production problem that arises, the *Free Pump* operator has the advantage of being able to qualify the source and scope of his problem quickly, easily and at a minimum of expense.

Plan now to reduce your pumping costs and experience new flexibility in your producing operations by switching to *Free Pumping*.

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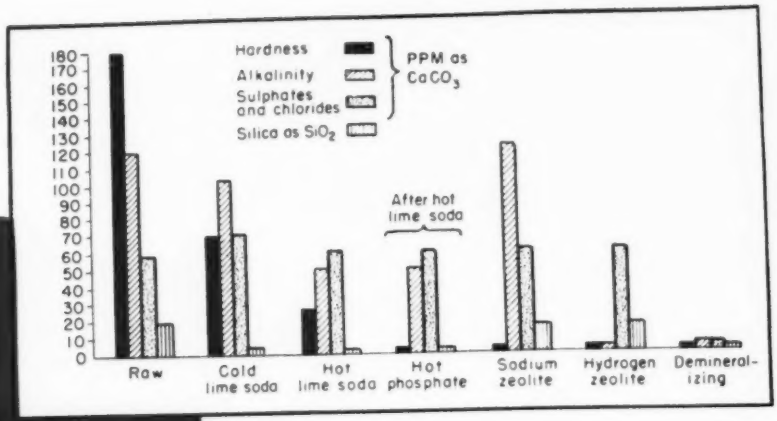

Fig. 1—Chart showing p.p.m. of silica, hardness, alkalinity, sulfates, and chlorides of typical water, and quantity remaining after treatment by various softening methods.

Modern TRENDS in INDUSTRIAL WATER TREATMENT

by R. C. Ulmer* and E. A. Lowenthal†

MANY recent articles on water treatment start out by pointing out that "the trend toward larger boilers and higher steam pressures has had a marked influence on water treatment." These articles would lead the reader to think that a completely new and different set of problems and system of treatment has appeared.

Actually the problems existing in water treatment today are not greatly different from those of several decades ago. They merely are aggravated by more severe operating conditions and also our "yardstick" in judging problems is different today. What was judged a clean boiler years ago would today in many cases be considered very unsatisfactory.

It is our opinion that the subject of water treatment is not necessarily as complex as it is sometimes made to appear. In general straightforward, logical procedures will eliminate the difficulties once the latter are known.

*Technical director, and †midwestern sales manager, Power Chemicals Division, E. F. Drew & Co., Inc., New York. Paper presented at thirty-eighth annual meeting, Western Petroleum Refiners Association, San Antonio.

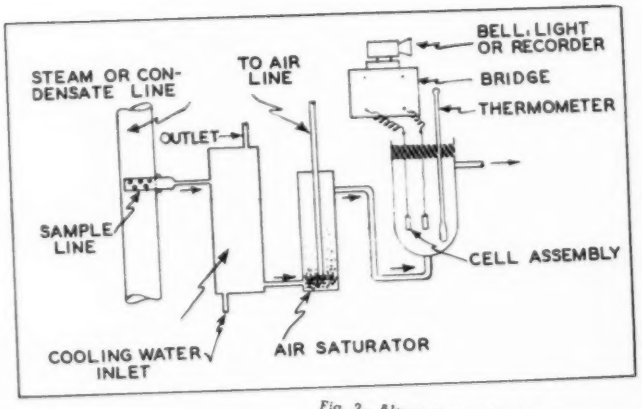

Fig. 2—Alarm or recorder for steam or condensate purity.

Present-Day Problems—Scale

"Scale" continues to be the major problem in boiler operation. However, our conception of scale has changed considerably and the word deposit or water-formed deposits is perhaps preferable. The A.S.T.M. gives the following definitions:

Scale.—Scale is a deposit formed from solution directly in place upon a confining surface.

Note: Scale is a deposit that usually will retain its physical shape when mechanical means are used to remove it from the surface on which it is deposited. Scale, which may or may not adhere to the underlying surface, is usually crystalline and dense, frequently laminated, and occasionally columnar in structure.

Note: Mill scale, formed on iron or steel heated in an atmosphere containing oxygen, consists chiefly of magnetic iron oxide, Fe_3O_4.

Sludge.—Sludge is a water-formed sedimentary deposit.

Note: The water-formed sedimentary deposit may include all suspended solids carried by the water.

Note: Sludge usually does not cohere sufficiently to retain its physical shape when mechanical means are used to re-

BLACK MAGIC comparison figures improve with age!

Most operators concede that a higher productivity is initially procured by drilling the pay zone with Black Magic oil base drilling fluid —but they raise the question, "What do the figures show five or ten years after completion? Will I get a higher ultimate recovery? Does Black Magic hold its original advantage?" The chart below answers these questions:

WATER BASE MUD
3579 bbls.
PER MO. AVERAGE

WELL	MONTHS	OIL PRODUCTION	MD. FT. SAND	SPI (last one) and DATE TAKEN	STATIC PRESSURE
A	87	490,800	25,300	.00531 (6/46)	3145
B	78	256,200	20,700	.00132 (4/47)	3135
C	84	260,200	21,000	.00129 (8/47)	3165
D	67	123,800	7,650	.00034 (3/46)	2995
TOTAL	316	1,131,000	74,650	.00826	12440
AVERAGE	**79**	**282,750**	**18,662**	**.00206**	**3110**

OIL BASE MUD*
5029 bbls.
PER MO. AVERAGE

E	94	603,400	24,000	.00284 (1/47)	3170
F	83	487,500	19,950	.00294 (8/47)	3100
G	52	205,200	17,820	.00345 (11/46)	2835
H	82	273,200	9,360	.00357 (8/47)	3125
TOTAL	311	1,569,300	71,130	.01280	12230
AVERAGE	**78**	**392,325**	**17,782**	**.00320**	**3058**

These are actual figures submitted by a major oil company who drilled 8 wells in the same San Joaquin Valley field. A very close relationship existed between their sand thicknesses, sand permeabilities, static pressures and millidarcy feet of sand. Four wells were completed with water base muds, four were completed with an oil base mud.* Data covers periods from 2½ to 3 years after initial well completion. All were produced under proration conditions and represent normal depletion practices.

The only known factor differing between these 8 wells is the type of muds used to complete them. For 78 months (6½ years) the wells completed with Oil Base averaged 1450 more barrels every month! Their average productivity index is 55% higher at the last reading, assuring longer life over the water base mud wells. With a filtrate loss of zero, Black Magic cannot possibly swell the clays inherent in oil sands nor "water block" the formation. That is why Black Magic wells show higher production years later, as well as at the start. For full information, write for paper, "What Happens Tomorrow," and a free copy of the Black Magic Handbook.

*The oil base mud used contained air-blown asphalt and was mixed with a refined type oil. After several notable improvements, this mud became known as Black Magic.

OIL BASE, INC., 130 Oris Street, Compton, Calif.

EXPORT: Simon P. Smith, Caracas, Venezuela; O. Saavedra E. Hijos, S. de R.L. Aberdeen, D.F.

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CORE LAB
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Professional **E-7**

MIDGET DIVER

College degree in petroleum engineering necessary, with minimum 15 years' experience in visually interpreting and evaluating basic reservoir data at bottom of hole during drilling operations. Working conditions are decidedly unpleasant. Rewards will be in keeping with the individual's competence. Our present employees not considered for this position. Replies held in strictest confidence.

Far-fetched? Agreed. But no more so than the theory held by a dwindling list of operators who follow inadequate and inconclusive methods of appraising a formation instead of obtaining comprehensive Core Analysis Reports.

Only from a core can you obtain *all* basic reservoir data necessary for – *accurately determining productive possibilities, fluid contacts, effective pay thickness, economic feasibility of testing and completing;* and for–*maintaining properly engineered control over a production program designed to result in maximum ultimate recovery.*

And only from Core Lab can you select, from all four proven core analysis methods, that particular type of service best suited to fit your current operating needs – both technically and economically:

1. *On-Location Core Analysis* – performed from either a "suitcase" lab or a truck-mounted unit. (The latter service is also available in conjunction with Well Logging, if desired.)
2. *Off-Location Core Analysis* – performed in one or thirteen permanent type laboratories located in or near all active drilling areas.
3. *Frozen Cores* – (Off-Location Analysis with On-Location Results) performed through use of the universally accepted Core-Lab-developed method of quick-freezing core samples for future analysis work.
4. *Large Core Analysis* – performed in permanent type laboratories equipped with special facilities for analyzing large cores from vuggy or fractured formations.

Plan your coring and core analysis programs with the same efficient forethought used in the exploratory and drilling phases of your operations. Call the Core Lab man nearest you.

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"From discovery to maximum recovery."

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PETROLEUM RESERVOIR ENGINEERING

TABLE 1—COMPARISON OF OPERATING RESULTS OF VARIOUS METHODS OF WATER TREATMENT

	A Hardness in effluent p.p.m. as $CaCO_3$	B Alkalinity reduction	C Total solids reduction	D CO_2 in steam	E Silica in effluent	F Must influent be clear	G Degree of skill to operate
1. Sodium zeolite	0-2	None	None	High if alk. is high	Not reduced	Yes	Low
2. Sodium zeolite plus acid	0-2	Up 100 % if desired	None	As low as desired	Not reduced	Yes	Medium
3, 4. 2 Hydrogen zeolite methods	0-2	Up 100 % if desired	Reduced with alk.	Same as 2	Not reduced	Yes	Medium
5. Cold lime soda	34-85 Depending on excess soda	Reduced by degree removal of $Ca(HCO_3)_2$ & $Mg(HCO_3)_2$	Reduced with alk.	0.44 × Na_2CO_3 excess, usually low	2-3 p.p.m. depending on amount of reagent	No but SiO_2 removal spoiled by very high turbidity	High
6. Cold lime plus zeolite	0-2	Same as 5	Same as 5	Same as 5	Same as 5	Same as 5	High
7. Hot lime soda	17-25	More than 5	More than 5	A little lower than 5 and 6	1—2 p.p.m. depending on amount of reagent	Same as 5	High
8. Hot lime soda plus hot phosphate	0-2	Same as 7	Same as 7	Higher than 7	Same as 7	Same as 7	High
9. Hot phosphate alone	0-2	Little	Little	Same as 8	Not reduced	No	High
10. Demineralizing	0-2	Nearly 100%	Nearly 100%	As low as desired	Not reduced	Yes	Medium
11. Demineralizing plus anion unit for SiO_2 removal	0-2	Same as 10	Same as 10	Same as 10	0.2 p.p.m. to 0.5 p.p.m.	Yes	Medium

move it from the surface on which it deposits, but it may be baked in place and be hard and adherent.

Corrosion products.—The corrosion product is a result of chemical or electrochemical reaction between a metal and its environment.

Biological deposits.—Biological deposits are water-formed deposits of organisms or the products of their life processes.

From the definitions it is obvious that it is difficult to classify the materials; i.e., the use of the word deposits. Of course, any deposit if adherent will have the same effect as scale and overheating and failures will result. A type of deposit that recently has been given considerable attention is iron oxide, usually present as magnetic iron oxide. This will be dealt with more completely under Internal Treatment.

Corrosion

Corrosion generally occurs either as general attack or pitting. General attack is due to a low pH or acid condition. Pitting is due largely to the presence of dissolved oxygen although it is often aggravated by a low pH. Corrosion in the boiler is easily controlled and well understood. That which occurs in the stream and condensate is not so well understood; in fact, it is often disregarded.

Caustic embrittlement, a special type of corrosion, appears to be disappearing with improved boiler design and construction. Where a possibility, the accepted practice is to first conduct a test to determine whether there is danger of embrittlement. If there is, positive preventive measures can be taken.[1]

Carryover

Carryover should be divided into (1) carryover of boiler water as such and (2) carryover of certain constituents selectively; for example, silica. With a better understanding of the mechanism and causes of carryover most common types have been eliminated. Foaming has in many cases been eliminated by improved boiler design; for example, the use of steam purifiers on the boilers. Priming, the other chief cause of carryover, can be controlled in many cases by insuring reasonable and proper operation of process equipment. Where carryover of boiler water of the foaming type persists, antifoams often remedy the situation.

Selective carryover of silica is commonly encountered at high pressures, usually above 600 psi. The silica vaporizes with the steam, the amount vaporizing being dependent on the amount of soluble silica in the boiler water. Consequently, commonly used methods of carryover prevention are not effective. The only effective basis of control is to limit or decrease the amount of soluble silica in the boiler water. This is discussed later.

General Considerations

With few exceptions water-treatment processes and equipment are made to fit the situation rather than the reverse. That is, type of boiler, pressure, steam temperature, and general type of operation are established, and it is the water consultant's job to recommend and supply a treatment to eliminate the difficulties which are likely to occur under the set of conditions. Knowing the above conditions of operation, the maximum concentrations of impurities which can be tolerated in the boilers can be determined and knowing the nature of the raw or makeup water available, the type of treatment necessary can be decided on.

First, it must be decided whether external treatment is required, desirable, or practical. In general, it can be stated that external treatment always is desirable since it is preferable to reduce all constituents in the water to a minimum. From a practical or cost standpoint, it usually is somewhat difficult to decide just when a water needs external treatment. An unbiased opinion is required since, naturally, suppliers of external treatment will favor this type of equipment, whereas suppliers of internal treatment will favor this type of treatment. Fortunately, most of the major water-treating companies can supply or handle both types of treatment so they may be considered somewhat unbiased.

As mentioned previously, the use to which the water in a given plant is to be put is pretty well defined. It remains to determine the safe operating concentrations and from this to determine whether the raw water requires external treatment or internal treatment only. It will be assumed that a water low in or free of suspended solids is available. (If not, filtration with or without coagulation will furnish such a water.) Four so-called impurities are normally considered: (1) total hardness, (2) total alkalinity, (3) total dissolved solids, and (4) silica.

Total hardness.—In deciding on the permissible limit for this constituent, suspended matter that would form rather than scale is the chief consideration. If the hardness is above a certain limit so much suspended matter will be formed by internal treatment only that baked-on sludge and/or carryover might result. A high blowdown rate would, of course, eliminate this difficulty but might be costly. The decision, therefore, rests largely on a compromise between the cost of external equipment and the losses from blowdown. General limits are as follows:

PERMISSIBLE HARDNESS IN MAKEUP

Pressure (psi.)	Phosphate control	Carbonate-organic control*
Up to 200	35 p.p.m. (2 g.p.g.)	85 p.p.m. (5 g.p.g.)
200 to 450	25 p.p.m. (1.5 g.p.g.)	50 p.p.m. (3 g.p.g.)
450 to 900	8 to 17 p.p.m. (0.5 to 1.0 g.p.g.)	Not desirable
900 and over	Less than 8.0 p.p.m. ($\frac{1}{2}$ g.p.g.)	Not desirable

*Usually some phosphate is used and the mixed sludge is considered less adherent than calcium phosphate alone.

There are exceptions to the above; for example, many plants use internal treatment only on waters as high as 300 p.p.m. of hardness or even higher. However, blowdown is very high and cleanliness of the boiler may be sacrificed in some cases.

Total alkalinity.—Excessive alkalinity in the boiler water contributes to carryover and, in addition, carbonate-type alkalinity causes carbon dioxide to be present in the steam rendering it corrosive. Caustic alkalinity, also, is one of the conditions conducive to caustic embrittlement.

The limit for carryover tendency is dealt with in the next item. The limit of alkalinity for condensate corrosion prevention is very low and usually not practical, but the lower it is maintained the less corrosive the condensate will be and/or the less condensate treatment will be required. A total alkalinity of 10 p.p.m. or less is desirable in the makeup, but in many cases is not practical.

Total dissolved solids.—This value is used largely as a measure of the tendency for carryover to take place. As good a guide as any is that set by the American Boiler Manufacturers Association:

Boiler pressure (psi.)	Total dissolved solids (p.p.m.)
0- 300	3,500
301- 450	3,000
451- 600	2,500
601- 750	2,000
751- 900	1,500
901-1,000	1,250
1,001-1,500	1,000

Alkalinity not to exceed 20 per cent of total concentration. Total soluble solids plus suspended solids not to exceed soluble solids by over 5 per cent. Oil or grease that can be extracted by sulfuric ether or chloroform not to exceed 7 p.p.m.

Note that this specification makes reference to suspended solids. Experience has indicated that suspended solids under most conditions stabilize foam. This action can be counteracted by antifoams, but again this may be expensive and, consequently, the suspended solids should be maintained as low as practical.

Silica.—Simple types of silica deposits can be eliminated in the boiler by ordinary internal treatment even when high silica contents are present. However, complex silicate deposits, for example, sodium-alumino-silicate (Analcite) usually require external treatment. This type of deposit is not very troublesome at pressures under 400 psi. Either the silica or the aluminum or both may be decreased. The real problem from silica, however, involve turbine-blade deposits. This problem was dealt with under carryover.

Once the general difficulties and problems are understood some knowledge of results that can be obtained with various systems of external treatment is required. This information is available from recently published work by Applebaum,[2] Calise, Yoder,[3] etc. Table 1 taken from the paper by Applebaum gives an excellent comparison of operating results with modern equipment. Information in graphic form on several of these items is shown in Fig. 1 taken from the paper by Calise. These data show very clearly what can be obtained through the use of modern water-treating equipment.

Having this information available the problem remains to select the treating process and equipment that will produce a feed water to meet the tolerances required in the boilers. Usually there will be a choice of one or more methods of treatment that will produce the desired results. Dependability and uniformity of results are important because the high investment in operating equipment such as boilers, turbines, process equipment, etc., must be protected and costly outages eliminated. Usually the choice will be a compromise lying between the two extremes of a perfect feed water with high equipment and operating cost on the one hand, and a satisfactory feed water with lower cost of equipment and automatic operation. A further discussion of these aspects of the problem is contained in the articles by Applebaum[2] and Calise.[4]

Internal Treatment

There is general agreement that waters not receiving external treatment require internal treatment. Until the past decade there was not such good agreement regarding the use of internal treatment where external treatment is used. This situation is dealt with in the paper by Applebaum[2] as follows:

"In addition to reducing hardness, silica and aluminum (by external treatment), it is advisable to build up an excess of phosphate in solution (PO_4) in the boiler saline to act as a chemical barrier against even small amounts of calcium forming scale. This excess of soluble PO_4 (usually 30 to 40 p.p.m. are necessary) forms a small amount of soft calcium phosphate sludge instead of hard scale.

"Such sludge must be kept in suspension in the boiler saline so that it can be blown off. In some cases a phenomenon known as 'sludge hideout' occurs. To prevent sludge hideout proper chemical 'dispersants' added to the boiler water have been known to help."

The above pretty well summarizes present-day ideas on the principle of internal treatment. Most water-treating companies follow these principles, although in some cases there is so much "myth and magic" surrounding the expressed method that they are almost obscured. This method as applied to general problems is summarized in Table 2.

Referring to this table, especially the suspended solids limit, it is obvious that either the hardness of the raw water must be low, for example of the order of 10 to 50 p.p.m., or else the blowdown must be high. This matter was dealt with in the section on external treatment. Also, as mentioned in some cases much higher hardness waters are handled with internal treatment only with correspondingly higher blowdown.

Considerable progress has been made in recent years on certain problems in internal treatment. There are two rather distinct views on handling of deposits in boilers: (1) setting up certain equilibria between the various ions present to promote the formation of sludges thought to be adherent, and (2) use of conditioners to render the sludge nonadherent. These and several other aspects will be dealt with briefly.

Phosphate Sludges

It is generally accepted that the calcium should be present as $Ca_4(PO_4)_2Ca(OH)_2$ (calcium hydroxyphosphate or hydroxyapatite) rather than as $Ca_3(PO_4)_2$. A certain minimum hydrate alkalinity is necessary (see Table 2). Even when present in the desired form some of the hydroxyapatite may adhere and sludge conditioners of the organic type are considered desirable. Magnesium hydroxyphosphate $Mg_3(PO_4)_2Mg(OH)_2$, on the other hand, is quite adherent. Two

TABLE 2—CONTROL IN INTERNAL TREATMENT

	Pressure of operation			
	Up to 250	251-450	451-900	900 & over
H	0.0	0.0	0.0	0.0
OH	150	130	100	50 to 80
Total alkalinity	200	160	120	60 to 100
PO_4	20 to 50	20 to 50	20 to 50	20 to 50
SiO_2	Up to 200	50 to 60	20 to 60	5 to 20
Total dissolved solids	3,500	3,000	1,500 to 2,500	1,000 to 1,500
Suspended solids*	500	400	300	50 to 200

*The values shown are higher than those given by the A.B.M.A. This is possible through the use of antifoams and sludge conditioners currently available. In fact, still higher values are often permissible.

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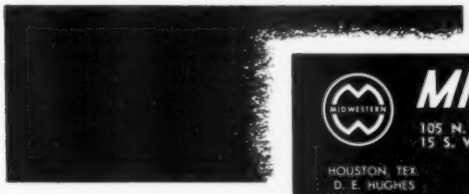

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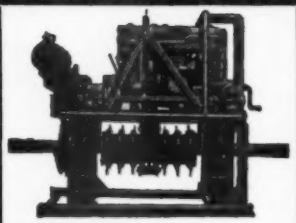

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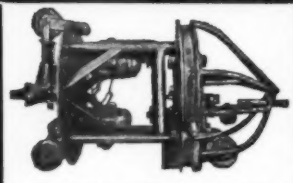

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approaches have been used on this problem: (1) cause the magnesium to precipitate as silicate, and (2) prevent the adherence of magnesium phosphate by use of sludge conditioners. Marked success has been had with both systems.

Decision as to which approach should be used quite often rests with the type of control that can be practiced. Very close control of the various equilibria are required to insure the presence of all of the materials in just the correct form, for example, as hydroxyapatite and magnesium silicate. Also, the addition of silica to the system is questionable in many cases, especially if there is danger of turbine-blade deposits and complex silicate deposit formation. On the other hand, less control generally is required in the use of a sludge conditioner.

Silica

Interest in silica concentration in boiler water in recent years has been centered more on control of turbine-blade deposits than on deposits in boilers. This is due to data obtained regarding volatilization or vaporization of silica with the steam.[5] This type of steam contamination cannot be controlled by eliminating carryover. About 1 per cent of the silica in the boiler water passes over with the steam. Therefore, the only control is to limit the amount of silica in the boiler water.

The silica either must be removed externally as discussed previously or precipitated in the boiler. Considerable work has been done on this subject.[6,7] Magnesium can be added internally to the boiler to precipitate the silica. By maintaining a low PO_4 concentration in the boiler water and through the use of sludge conditioners there is no danger of magnesium deposits. Silica in the boiler water can be maintained in the range of 2 to 8 p.p.m. by this method. Thus, silica in the steam is maintained at such a low value that troublesome deposits will not form in the turbines.

Iron and Copper Oxides

In high-pressure boilers using very pure makeup, deposits of the type shown in Table 3 are commonly encountered. In some cases the iron content is even higher. Note the very low content of the usual scale-forming materials, calcium and magnesium. The deposits quite often form in the high heat-transfer areas causing tube blisters and failures. In many cases the deposits are quite thin and so adherent and regular that their presence is sometimes missed.

TABLE 3—CHEMICAL ANALYSIS OF INNER SCALE

	Per cent
Moisture	0.40
Analysis on a dry basis:	
Ignition loss	4.66
Silica	2.07
Copper oxide	25.91
Lead oxide	0.64
Iron oxide	16.05
Aluminum oxide	12.66
Nickel oxide	1.59
Calcium oxide	Trace
Magnesium oxide	4.57
Zinc	17.65
Phosphorus pentoxide	10.58
Chloride as chlorine	Trace
Sulfur trioxide	0.64
Alkalies (by difference)	2.97

Two general approaches are followed to control and/or eliminate such deposits. In the first place, the source of the iron and copper must be ascertained. Obviously, if appreciable iron is present in the makeup it should be eliminated by external treatment. The same applies to iron and copper pickup in the condensate returns. Corrosion inhibitors for this purpose are quite effective. Finally, if the deposits are forming in situ by reaction of the concentrated boiler water, steps should be taken to eliminate the attack.

By these methods the difficulty can usually be decreased, but further treatment is necessary. In the second case, consideration is given to eliminating the deposits through the use of sludge conditioners. The same general considerations as discussed above apply to the use of such conditioners.

Steam and Condensate Purity

Use of conductance methods for determining water purity are well known.[8] The use of conductance apparatus for indicating when the purity decreases beyond a desirable limit is not so well known. Typical equipment for this purpose is shown in Fig. 2. The sample may be either steam or condensate. Hence, the apparatus is ideal for use on carryover problems and for condenser leakage. In any case, the desired purity or conductance limit is set on the instrument. Under this condition a green light is on; when the conductance exceeds this limit a red light comes on and a bell or horn sounds. By depressing a button the bell or horn is cut out but the red light stays on until the conductance decreases to the original value. The apparatus automatically resets itself at this point. Correction for temperature can be made by setting the temperature compensator dial. Completely degassed samples are preferable but good results have been obtained with gasified samples where carbon dioxide is the variable. Actually dissolved gases do not interfere unless their concentration varies.

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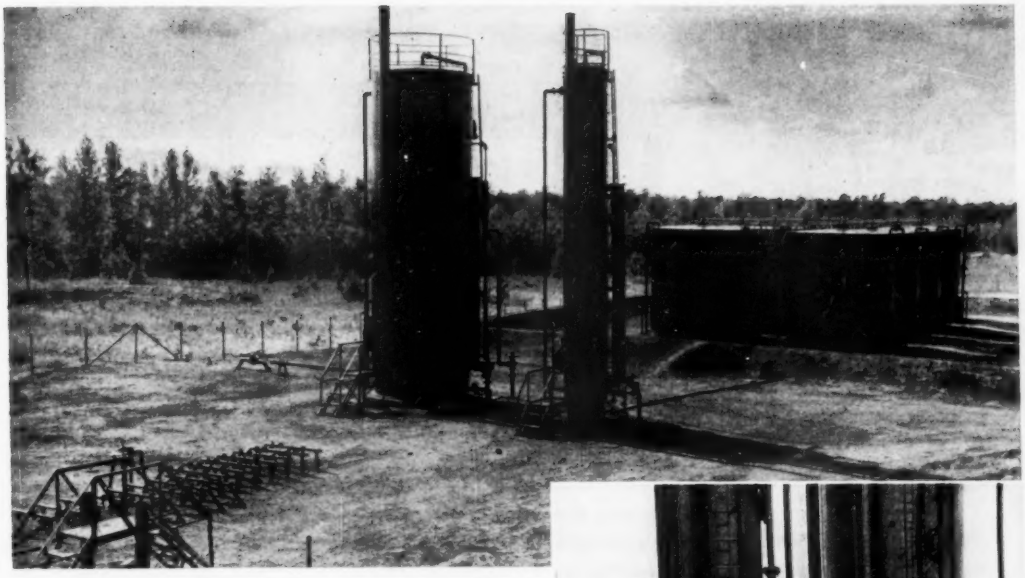

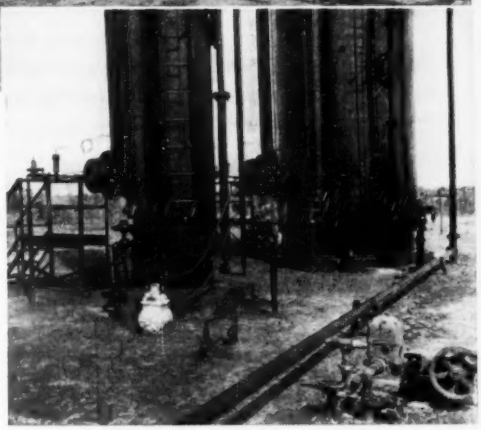

Above: Well manifolds, heater-treaters, and tanks at consolidated Battery "A." Right: In front of smaller treater is small hose-connected positive-displacement gas meter used to obtain gas-oil ratio data. Immediately to right of gas meter is ⅝-in. water meter.

WATER FLOODING

Wesson Hogg Sand Reservoir to

INSURE MAXIMUM OIL RECOVERY

by Sterling S. Lacy, Jr.

Summary

A DISCUSSION is given of the (1) geology, (2) history of development, and (3) unitization of the Wesson Hogg sand reservoir for the purpose of water flooding to insure maximum oil recovery. Development of an adequate water supply and installation of the injection system and necessary plant equipment were required to inaugurate the desired program, and to arrest the rapid decline of bottom-hole pressure before the bubble point for the crude was reached.

Bottom-hole-pressure decline was arrested in January 1949, and, since that time, the reservoir pressure has been increased 82 psi. It is estimated that the recovery of 18,775,000 bbl. of oil, in excess of the 11,410,000 bbl. recovery expected by primary production methods, will ultimately be realized under the water-flood program.

Consolidation of the original lease storage tanks into five conveniently located batteries provides many advantages, and a gravity return system from the batteries permits reinjection of produced water. Extraneous gas was found to be entering the reservoir near the fault; now, however, available information indicates that additional gas encroachment has been blocked off by injected water.

Geology of Wesson Field

The Hogg sand, which was formed as a submarine bar during Lower Cretaceous time, is classified as part of the basal Pine Island formation. This sand is found at an average subsea depth of 2,900 ft. or approximately 3,150 ft. below the ground surface in the Wesson field area. Though it is highly porous and permeable, this sand quickly grades to shale at the edges of the reservoir and is limy near its base.

A Lower Cretaceous fault with approximately 180 ft. of displacement formed the trap favorable for oil accumulation. This fault is the northeast boundary of the reservoir and the narrow sand bar extends over 5 miles in a southwesterly direction to the oil-water contact. In the highest structural well near the fault the top of the sand is 223 ft. above the original oil-water contact. The pro-

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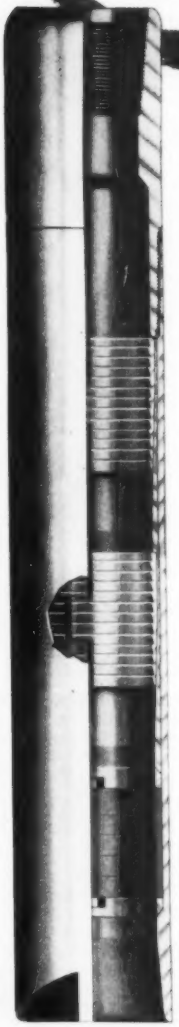

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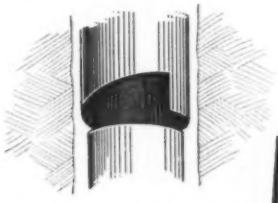
Here's all you do to make a quick positive casing repair with the Baash-Ross Casing Bowl. First, cut the casing below the defective area (Baash-Ross makes a cutting tool that is ideal for this job!) and remove the upper portion of the string from the well. Discard the defective portion of the string, replace with good casing and attach a Packing Casing Bowl to the bottom of this replacement string. After the repaired casing string is run back into the well, it is lowered until the top of the casing standing in the hole passes completely into the Casing Bowl and seats against the shoulder in the upper portion of the Bowl.



Then the string is simply raised a short distance to set the slips and expand the lead packing to a permanent, pressure-tight fit against the casing in the well . . . the casing suspended at the surface in the usual manner to retain the tension . . . *and the job's done!*

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Note in the cutaway view of the Packing Casing Bowl how the upper and lower steel rings that retain the lead packing elements have a compressible joint like a piston ring. This permits them to close around the pipe along with the lead as it expands, thus preventing the lead from extruding out of the packing area. Result—a tight leakproof pack-off between the old and new casing sections, without need for cementing or other complicated sealing operations!

FULL INSIDE DIAMETER

Another important advantage is that the *minimum* inside diameter of the Baash-Ross Casing Bowl is equal to that of the Casing to which it is attached. Any tools, liners or other equipment that will pass through the casing string will also pass through the Casing Bowl without hanging up!

CEMENT JOB IS UNAFFECTED

Since the Packing Casing Bowl attaches to the top of the casing standing in the hole, the cement shut-off around the shoe is not disturbed. This, coupled with the tight leakproof joint effected between the Casing Bowl and the casing in the hole, assures the repaired string being just as watertight as the original casing job.

TWO TYPES—FULL RANGE OF SIZES

Baash-Ross Packing Casing Bowls are available in two types—one with a *single* set of slips for gripping the top of the casing in the hole for use with short strings of casing . . . and the other with a *double* set of slips where extra gripping efficiency is desired on longer casing strings. In both types the packing element is essentially the same.

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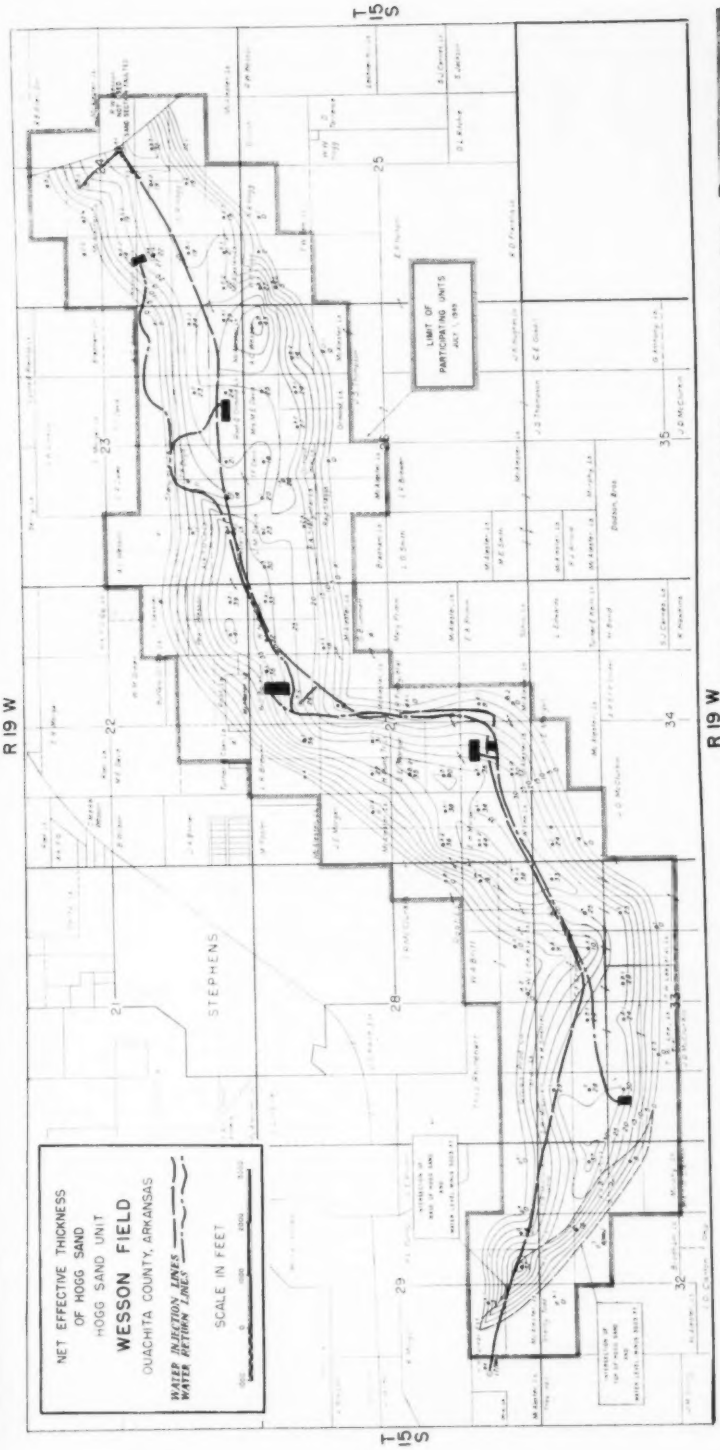


The author is a petroleum engineer with McAlester Fuel Co., Magnolia, Ark. He is a graduate of Texas A. & M. College, from which institution he received his bachelor of science degree in 1947. He joined his present company immediately after graduation.

ductive area, covering 1,540 surface acres, is calculated to have originally contained 30,185 productive acre-feet of saturated sand.

History of Development

The Hogg sand was initially proven productive in McAlester Fuel Co. A-1 R. W. Wesson, located in the C NW NW SE 24-15s-19w, Ouachita County, Arkansas. This well was completed January 24, 1946, through perforations from 3,085 to 3,102 ft. and flowed 246 bbl. of 33°-A.P.I.-gravity oil through a 13/64-in. choke with 200-psi.-tubing pressure. The original gas-oil ratio was estimated to be 100 cu. ft. of gas per barrel of stock-tank oil.

Early development on a 20-acre spacing pattern centered around the SW¼ of Section 24. During the first 8 months of operation only 112,170 bbl. of oil were produced from 10 wells by natural flow before the rapidly declining bottom-hole pressure necessitated artificial lift.

A well allowable of 100 bbl. per day remained in force for 1½ years until September 1, 1947, when it was reduced to 75 bbl. per day because of the continuing rapid decline in bottom-hole pressure. The production of 689,816 bbl. of oil caused a drop of 645 psi. from the original pressure of 1,299 psi. measured on a sand base datum. Early analysis of reservoir data indicated that oil production was being obtained primarily by fluid expansion, since no free gas cap existed; and the rapid decline in bottom-hole pressure proved that no effective water drive existed.

Development progressed slowly to the southwest until Lee and Burnett's wildcat discovery, located over 1¼ miles southwest of the nearest proven production, touched off a spark of rapid exploration which climaxed development in the fall of 1947. By the fall of 1948 the oil-water contact had been reached, thus virtually defining the reservoir except for adjustments of sand thicknesses in selected areas.

Formation data.—Based on available core data the Hogg sand has an average porosity of 32 per cent, an average permeability of 2,770 md., and an average thickness of 24 net feet

Field rules established by the Arkansas Oil and Gas Commission required the setting of approximately 100 ft. of surface casing. Rotary equip-

ment and native mud were used to drill a 9-in. hole through the sand.

A good many wells were cored with conventional core barrels and hard-formation cutter heads; however, core recoveries were disappointing, resulting in incomplete core-analysis data. It was a peculiar characteristic of the pay interval to show very little change in drilling or coring time.

After the electric log was run, either 5½ or 7-in. casing was set through the sand and cemented by the pump-and-plug method. Because of the proposed gas-injection program, the majority of the wells were completed by gun perforating the lower part of the sand.

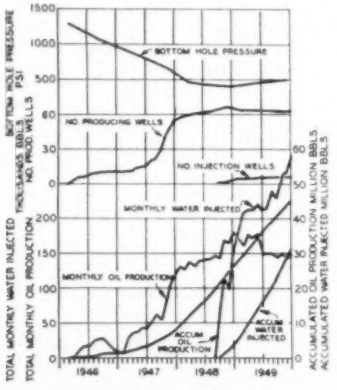
Unitization for Pressure Maintenance

During the early productive life of the field the need of pressure maintenance for the reservoir was realized, and plans were made for a gas-injection program to serve the 11 wells then producing from the sand. Subsequent development proving additional area together with delay in delivery of compressor equipment interrupted the initial plan, but the operators began holding meetings in August 1947 to discuss unitization for pressure maintenance. The operators appointed an engineering committee with instructions to assemble pertinent data and also commissioned James A. Lewis, an independent petroleum engineer, Dallas, to make a study of the reservoir to determine which of two media, gas or water, would be the most efficient and economical flushing medium. Lewis reported in December 1947 that: (1) a recovery of 378 bbl. per acre-foot could be expected by natural depletion, (2) gas injection would increase recovery to 800 bbl. per acre-foot, and (3) water injection should recover 1,000 bbl. per acre-foot.

The plan for unitization gained support and on June 15, 1948, the operators appeared before the Arkansas Oil and Gas Commission and presented evidence showing that 100 per cent of the owners of working interest had signed the unitization and pressure-maintenance agreement and that approximately 77 per cent of the royalty owners had signed the royalty pooling agreement. These documents were approved to become effective July 1, 1948, and McAlester Fuel Co., as appointed operator, assumed operation of the 60 producing wells in the unitized area.

On October 1 of that year the productive acreage of the unit was expanded by eight new wells completed during August and September. Most of these wells were completed after the beginning of unit operation.

Under the unitization agreement, any operator who believed his tract contained more than the assigned productive acre-feet could drill a slim hole or core test to prove or disprove the allocated sand thickness. Six different operators drilled 11 core tests during the first year, 7 of which resulted in gains for the operators. The reservoir was considered defined on July 1, 1949.



Wesson pool-production and injection data.

Unit Operation

To inaugurate the desired program as quickly as possible several major phases of the over-all project were outlined as follows: (1) development of adequate water supply, (2) early installation of a centrally located water station and injection system, (3) consolidation of existing lease-storage facilities into five conveniently located batteries, (4) a gravity gathering system, (5) a unit road system, (6) a unit gas system, and (7) compilation of accurate engineering data, including additional bottom-hole-pressure measurement, gas-oil ratios, productivity indexes, complete gas, oil, and water production data together with injection volumes and pressures.

Development of Water Supply

Since an adequate source of fresh water was not available, salt water was selected as the flooding medium. The Nacatoch horizon, which occurs at approximately 1,500 ft., is the first major salt-water sand. This blanket sand, approximately 180 ft. thick, offered the most favorable possibility for development. After an unsuccessful attempt to recomplete a dry hole, a new well was begun. A 12¼-in. hole was drilled to 1,700 ft.; 9⅝-in. casing was set and cemented on bottom with 300 sacks of cement. A sand section, 7 ft. thick, was then exposed by gun perforation with 10 shots per foot. A two-batch plastic squeeze job was performed prior to any production, to consolidate the loosely cemented fine sand. After swabbing had indicated the well to be sand free, a submersible centrifugal pump powered by a 52½-hp. electric motor, was run on 3-in. tubing. A week of testing proved the well capable of producing in excess of 5,000 bbl. per day of sand-free water.

A second water supply well was drilled approximately 1,300 ft. from the first and completed in the same manner, except that two sections of sand, each 7 ft. thick, were opened and consolidated in an effort to develop a well of greater capacity. This well was equipped with 4-in. tubing and a 97½-hp. submersible pump. Testing proved this well capable of producing in excess of 7,500 bbl. per day.

A third water-supply well was obtained by successfully recompleting a former producing oil well. The Hogg sand interval was plugged off and 19 ft. of the Tokio sand, which occurs at approximately 2,400 ft., was opened by gun perforation. A shaft-driven turbine pump was set at 400 ft. This Tokio supply well is capable of producing approximately 3,000 bbl. per day.

Temporary Injection System

Following the completion of the first water-supply well, temporary 3 and 4-in. lines were laid to two nearby producing wells which had been selected for conversion to water-injection wells. The injection wells were prepared by perforating the entire pay interval and injecting water through the tubing. Unit wells Nos. 36 and 55 were selected because they were thought to be located in bottleneck areas. The plan for the flood pattern was to inject water into the more narrow portions of the reservoir, draw the water to each edge, and then move a wall of water down the axis of the reservoir, forcing the oil ahead.

Due to the scarcity of tubular products, installation of the permanent injection system was delayed; however, the urgent need of injecting additional water necessitated extension of the temporary system to two additional injection wells. By January 1949 water was being injected into five wells in five different reservoir areas.

Injection-Plant Equipment

A C-100 reciprocating pump was installed, equipped with bronze valves, rods, seats, and liners to resist the corrosive action of the salt water. This temporary injection pump was powered by a 125-hp. gas engine. Two 10 by 20-ft. vertical filters were installed to filter all water prior to injection, and two horizontal 10 by 20-ft. accumulator tanks were erected to backwash the filters. These tanks were provided with gas blankets to prevent the water from coming into contact with air, thus maintaining a closed system.

Previous analyses of the Nacatoch water revealed a potential precipitate of 13 lb. of iron per 100 bbl. of water if the water was aerated; however, since the iron was in the ferrous state, it would remain in solution if kept from contact with air. Also, the gas blanket on the filters has provided more flexibility in the system.

By maintaining a pressure differential on the two vessels it is possible to exceed the designed capacity of the filters, since the water produced by the supply wells is clean and does not tend to plug the sand face of the filters. The filters are backwashed once each week, but no great amount of sediment has ever been recovered by backwashing.

A 4 by 6, six-stage centrifugal pump was installed as a permanent injection pump. This cast bronze pump, powered by a 300-hp. electric motor, can handle 18,000 bbl. per day operating under 750 psi. The reciprocating power pump has been retained for standby service in the event of electrical power difficulties or failure of the centrifugal pump. Electrical float switches have been installed on the accumulator tanks, which could shut down either injection pump or the water supply wells. Also, an electric pressure switch, sensitive to a drop in normal line pressure, will be used to shut down either injection pump in the event of a break in the injection system.

A 20,000-bbl. welded steel tank was erected to store produced water so that the injection system could still operate in the event of water supply or electrical power failure. Two 3 by 4 centrifugal booster pumps pull water from the storage tank or gravity gathering lines and deliver the water to the filters. One pump is operated by a 7.5-hp. electric motor, and the other pump, a standby, is powered by a combination natural gas-gasoline engine.

Permanent Injection System

The permanent injection system was designed for a maximum working pressure of 750 psi., and line sizes were calculated to give minimum friction loss. Cement-lined steel pipe was used to withstand interior corrosion caused by the salt water. The outside of the pipe was covered with a protective pipe coating to minimize exterior corrosion. Seven-inch cement-lined pipe extends from the plant east to well No. 36 and west to well No. 55. The line size then becomes progressively smaller (from 5 to 3 in.) as the volume of water to be handled decreases.

Two-inch high-pressure turbine-type meters measure the injected water at each input well. Meter loops, which provide a bypass for the meter, are also used to control the volume of injected water. These meter loops have been standardized in length, and a spare loop is held in reserve.

Water-injection rates are based on the volume of the reservoir served by each injection well. The volume of water injected exceeds that of the oil, water, and gas withdrawals from any area. Injection rates vary from 850 to 2,400 bbl. per day per well when the total daily injection is 9,000 bbl. per day.

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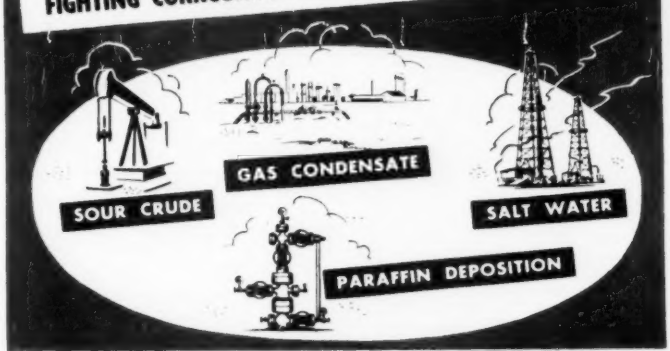

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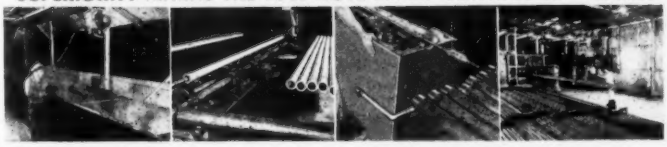

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injected has increased from 2,271 bbl. per day in September 1948 to 9,513 bbl. per day in December 1949. Oil production during December averaged 4,857 bbl. per day. Water injection in excess of reservoir withdrawals will be maintained to increase the bottom-hole pressure to 1,500 psi. so that the wells will return to natural flow.

It is estimated that a coverage of 75 per cent of the reservoir will be obtained by the flood pattern even though there are many edge locations which have not been drilled. It is calculated that 74 per cent of the reservoir volume lies within the limits of the 20-ft. isopach line. Additional edge wells will be drilled to give maximum coverage of the reservoir upon the accumulation of sufficient data properly to locate such wells.

Consolidated Tank Batteries

Prior to unit operation approximately 40 sets of tank batteries served 68 producing wells.

Consolidation of tank batteries was commenced in order to (1) reduce production costs, (2) minimize the number of treater installations, and (3) facilitate gathering of produced water. Five locations at points of high elevation in the field were selected as sites for the consolidated batteries.

Consolidation of batteries began with unit battery "D," where four additional tanks were moved intact from various leases and combined with four high 500-bbl. bolted steel tanks already in use. To prevent interruption in the normal production schedule only one tank was moved from each lease battery. After the first battery was completed, all material salvaged from the consolidation was used to begin work on the next battery.

Individual flow lines from all wells in the area were laid to a common header in the battery. Each header was made to serve approximately 15 wells, provision being made for additional wells which might be completed at later dates. The header provides a method of switching any well to an individual treater for well test while all other wells are producing into the large treater.

At each battery two treaters were installed for gas, water, and oil separation. The individual test treaters are 4 by 28 ft., each being equipped with ⅝-in. meters to measure the water produced. Positive-displacement gas meters are being used to measure gas production. Risers to the tanks are equipped with valves so that any one of the eight tanks may be used for individual well tests. Continuous tests are conducted in each battery, and at least one test is run on every producing well each month.

The 10 by 28-ft. treater at each battery is capable of separating simultaneously all water, oil, and gas produced by 15 wells. Water separated from the oil is measured by 2-in. meters at each battery before it enters the gravity return system. Oil may be produced into any one or all of the eight tanks.

A small circulating pump has been installed at each battery which takes suction from the tanks and discharges to the large treater. This pump can serve a threefold purpose: (1) circulating a bad tank of oil back through the treater, (2) circulating tank bottoms back through the treater to minimize tank cleaning, and (3) drawing oil from below the pipe-line connections in several tanks, pumping it into one tank to be run. To date no tanks have had to be cleaned in the unitized batteries because of bad tank bottoms.

Gravity Gathering System

Injected water which is produced with the oil is separated by the treaters of the consolidated batteries and returned to the injection plant for filtration and reinjection. This water is returned through approximately 5 miles of 4 and 6-in. asbestos-cement pipe. Since all five consolidated batteries are located on points of high elevation, a complete gravity system is employed to return the water to the filters, eliminating the cost of pumping.

Cycling the produced water will (1) reduce the amount of supply water necessary, and (2) solve the problem of salt-water disposal.

Unit Road System

In order to make each well accessible during the winter months, all-weather roads were constructed to the majority of the unit wells. Ramps for a pulling unit and turnarounds were also added. Certain leases, which are in low areas, would have been virtually inaccessible during inclement weather.

Unit Gas System

At the beginning of unit operation, each well utilized its produced gas as fuel for the pumping engines. In addition to making it virtually impossible to obtain accurate gas-oil-ratio measurements, this arrangement caused considerable down time for the wells because of an inadequate gas supply. A field gas system connecting the five consolidated batteries was extended to each producing well. This system provides a common supply of fuel gas to the unit wells and has resulted in very satisfactory operation.

Extraneous Gas

After the reservoir pressure had declined below 700 psi., increasing gas-oil ratios were observed in the highest structural wells. As the pressure further declined it was thought that gas was breaking out of solution from the oil, but a bottom-hole sample analysis showed that 364 psi. was saturation pressure for the crude, a point to which the pressure was never allowed to decline.

Further investigation revealed that the James lime was thrown opposite the Hogg sand by the fault on the

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northeast end of the reservoir. The James lime, tested in wells near the fault, was found to carry a high-pressure gas. It is now assumed that the extraneous gas was entering the reservoir through the fault plane. The effects of this extraneous gas was first observed in unit well No. 3, when this well resumed natural flow after it had been on beam pump for nearly a year.

Soon other wells in the area adjacent to the fault showed the effects of the gas. Unit well No. 13 began uncontrolled flow through the casing, producing several hundred barrels of oil before again being brought under control. Similarly, well No. 14 was being pumped with the casing valve open, and gas caused the well to flow through the annulus. Other wells in this area which have at some time resumed natural flow are Nos. 2, 4, 6, and 15. Gas-oil-ratio tests revealed that these wells began flowing after exceeding a ratio of 650 cu. ft. of gas per barrel of oil.

Bottom-hole sample data show that the oil contains only 65 cu. ft. of gas in solution per barrel of stock-tank oil; all gas produced in excess of this amount is classified as extraneous gas. The effect of this extraneous gas has been felt as for down the reservoir as battery C.

Entrance of extraneous gas into the reservoir served somewhat to retard the rapid decline in bottom-hole pressure, but it is felt to be harmful to the reservoir under the water-flood program. The extraneous gas has created a partial gas cap in certain areas and is retarding the fast build up in bottom-hole pressure expected from water injection. The major harm expected from the gas is water channeling due to the difference in relative permeabilities of the sand to oil and gas. Water injection into well Nos. 1 and 3, which are near the fault, has now blocked the entrance of additional gas.

Results Obtained by Water Injection

Water injection halted the bottom-hole-pressure decline in January 1949. At that time the total production of 2,701,537 bbl. of oil had reduced the pressure by 887 psi. to a low of 412 psi. At the time of the last pressure survey on November 30, 1949, injection of 2,904,157 bbl. of salt water had increased the pressure by 82 psi.

Water injection has definitely benefited well No. 65. In this well the base of sand approximates the original oil-water contact and the well has always produced water. During the first 10 months following completion this well was not capable of producing the assigned allowable of 75 bbl. per day; however, after water injection was commenced in unit well No. 69 a gradual improvement has been observed. The average monthly production for the first 4 months of operation was 1,264 bbl., compared to 2,433 bbl. per month average for the last 4 months. This is a 92.4 per cent increase in oil production, while a decrease in water per cent has been observed.

To January 1, 1950, 4,572,721 bbl. of oil together with an estimated 115,235 bbl. of water have been produced from the Wesson Hogg sand reservoir. Total water injected amounts to 3,199,045 bbl. The accumulated oil production to date represents a recovery of 151 bbl. per acre-foot or 15.1 per cent of the estimated ultimate recovery of 30,185,000 bbl.

Acknowledgment

The author sincerely appreciates the assistance given by Vernon J. Turner, chief engineer; James Scurlock, geologist, and Miss Ruth Cravy, secretary. Appreciation is also extended to the management of McAlester Fuel Co. for permission to publish this paper.

BOOKS

ENGINEERING PAPERS OF HYDRAULIC INSTITUTE. Published by Hydraulic Institute, 90 West Street, New York, 60 pp.

Four papers are included in this pamphlet: (1) "Cavitation in Centrifugal Pumps," (2) "The Centrifugal Pump in the Process Industries," (3) "The Operation of Centrifugal Boiler Feed Pumps," and (4) "Submergence for Centrifugal Condensate Pumps." These papers are the result of a contest started in 1940 by the Hydraulic Institute among the employes of its members, the purpose of which is to stimulate the interest of these employes in various fields of the pump industry by means of awards for essays submitted by them.

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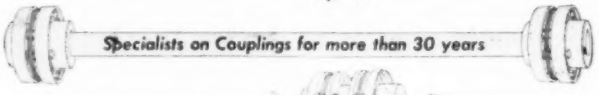

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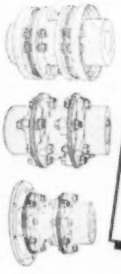

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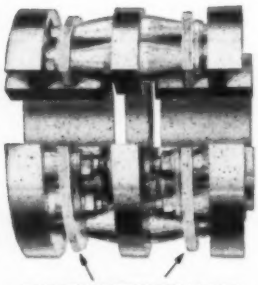

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PROGRESS in METALS

by W. L. Nelson
Consulting Engineer

Powder Metallurgy

POWDER metallurgy is a method of forming metal parts from fine metal powders compressed to shape by mechanical means and held in shape by bonding of the molecular edges of the powder particles by a heating or sintering operation. Generally, lubricants must be added, and occasionally different kinds of powders must be blended. The thoroughly mixed powder is compacted by means of dies into a briquet. The relatively frail or "green" briquet is heated in an oven, in an inert atmosphere, at a temperature that is usually substantially below the melting point of the metal. If exceptionally close tolerances or additional strength are required, the sintered part is sized or coined by a re-pressing operation after it has cooled.

Applications.—Powder metal processing generally replaces casting, forging, stamping, machining, and other forming operations. The powdered metal parts can be made at greatly reduced cost and to equal specifications. It is best adapted to small parts. Hundreds, perhaps thousands, of products are now being made successfully and profitably by the new forming operation. Obviously, the saving in cost varies widely because of the great differences in parts manufactured by powder metallurgy, but in a study of 10 small parts the total saving in cost ranged from about 29 per cent to as high as 88 per cent.

Certain special combinations accomplish results not possible by the customary forming methods. A self-brazing alloy is made by combining powdered copper with powdered steel. Lead may be dispersed in copper for bearing surfaces so that the lead provides antifriction properties and the copper provides strength. Thus, pairs of metals that ordinarily cannot be combined into alloys can be joined together as powder giving unique and often useful properties. The porosity of powder metal parts is a valuable characteristic, particularly since it is controllable. The oilless bearing is the classic example of the value of porosity. After sintering, the oilless bearings are impregnated with lubricant so that the tiny channels between the pores act as a reservoir or supply of lubricant and at the same time act as capillaries through which the lubricant is drawn to the bearing surface. Such bearings hold 10 to 40 per cent of oil by volume.

Mechanical characteristics.—Although powdered metal parts look like ordinary metal parts, they weigh much less.

Sintering causes a dramatic increase in strength. Powdered iron, for example, in the form of green briquet has a tensile strength of perhaps 1,000 psi., whereas the strength of the finished product will run from 20,000 to over 100,000 psi., depending on various controllable factors in the processing. As an extreme example, tungsten, because of its extremely high melting point must be fabricated by powder metal processing. The tungsten is powdered, cold-pressed, and sintered into blanks which are then hot-worked and drawn into wires for electric-light filaments. In this form tungsten has the highest known tensile strength, namely 600,000 psi.

The addition of copper or graphite powders to iron powder need not greatly reduce the tensile strength. Strengths of 50,000 to 70,000 psi. are regularly attained and by special treatments 100,000 psi. is possible.

Iron-alloy parts can be hardened by conventional heat-treating operations such as quenching and tempering. Likewise, surfaces may be hardened by nitriding or carburizing. Powder metal parts can be electroplated with the usual plating metals. Precise tolerances can be attained. Dimensions are now commonly held to 0.001 in. and in some cases tolerances as low as 0.0005 in. can be maintained.

Completely satisfactory theories to account for the strength of powder metal parts have not been presented. It is possible that the strength is due to intermolecular or interatomic action or bonding.

The above material was condensed from the booklet entitled, "Powder Metallurgy Today," prepared by the F. J. Stokes Machine Co., Philadelphia. The booklet aims at informing rather than selling powder metallurgy and it should be of particular value to students and workers in powder metallurgy.

Electrodeposited Metallic Coatings—Specifications And Tests

THE 1949 edition of this publication, "Specifications and Tests of Electrodeposited Metallic Coatings," sponsored jointly by American Society for Testing materials and American Electroplaters' Society, brings together in convenient form all of the standard specifications and test methods pertaining to electrodeposited metallic coatings on metals. These two organizations have been cooperating for years in research and standardization work. The A.S.T.M. activity in this particular field is carried out by its Committee B-8 on Electrodeposited Metallic Coatings.

In the compilation are specifications for various types of electrodeposited coatings on steel, i.e.: zinc, cadmium, nickel and chromium, and lead. There are specifications for electrodeposited coatings of nickel and chromium on copper and copper-base alloys, and on zinc and zinc-base alloys; also a specification which covers chromate finishes on electrodeposited zinc, hot-dipped galvanized, and zinc-die-cast surfaces.

Two methods are given, one covering test for local thickness of electrodeposited coatings, and the other salt spray (fog) testing.

Included also are the following recommended practices: chromium plating on steel for engineering use, and the preparation of low-carbon and high-carbon steel for electroplating.

Copies of this 62-page publication, paper cover, can be obtained from American Society for Testing Materials, 1916 Race Street, Philadelphia, at $1.25 each.

Leaded Steel Again Available

A leaded, free-machining steel known as Ledloy is again being marketed by Joseph T. Ryerson & Son, Inc., Chicago. The composition of the alloy has not been disclosed but it is probably similar to the "E" steel and La-led compositions announced during 1949 by Jones & Laughlin Steel Corp. and LaSalle Steel Co., respectively. During the war and during the postwar period, the production of leaded steels was curtailed, and not until recently has manufacture been resumed.

Machinability ratings for the new alloy have not been established but it is claimed that the new steel can be machined 30 to 50 per cent faster than A.I.S.I. B1113 which for some time has been accepted as the fastest cutting screw steel.

Cutting tools used on Ledloy are said to last from 50 to 200 per cent longer between grindings. It is also claimed that it provides a smoother finish and a better base for plating than other free-cutting screw steels. It is an open-hearth steel and therefore has a somewhat better strength and ductility and will carburize better than free-machining Bessemer steels.

Forging Terms or Operations

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Imparting a high finish to work by squeezing it between smooth surfaces. Usually a cold or low heat finishing operation accomplished by a power press.

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AP-304

Socony-Vacuum Revamps Paulsboro Facilities

(Continued from page 79)

onto tractor trailers. At dockside or storage points, additional fork trucks with drum grabs unload the tractor trains and stack drums in single or double tiers. Fork-truck handling of drums out of storage is similarly employed.

The extensive use of fork trucks and tractor trains for all conveyance other than point to point, necessitated improvement of floors and roadways to accommodate the small-wheeled trailers. Where necessary, building floors were resurfaced. Entrance ramps with gentle slopes were installed. A railroad spur-line crossing between docks and filling lines is traversed by an elevated drawbridge to avoid grading down to railroad-track level. Railroad platforms and docks are being resurfaced where necessary.

All outside roadways and areas to be used by fork trucks or tractor trailers will be finished in a smooth hard surface laid over a network of piping. Hot-water circulation through these radiant grids in winter will keep these areas continually free of ice and snow.

Barrel Filling

Offering the second most important possibility for savings, barrel-filling operations were assigned next priority in the revamping program. Engineers estimated that the elimination of manhandling barrels during inspection, branding, and filling would reduce labor costs 40 per cent, at the same time materially improving working conditions for operators.

An 11-car railroad platform traversed by live conveyor lines will handle the unloading of 10 cars of empty drums daily. The building formerly used for assembly and storage of wooden barrels is being modernized and refitted for the new barrel-filling lines. Four experimental stenciling and filling lines have been installed and studies resulting from their operation will determine the features to be incorporated in the new barrel-filling department. To date, efficiency of these new facilities has exceeded original estimates.

A package-standardization program to meet all needs has been adopted to simplify storage, checking, and handling. As drums enter the filling building from unloading platform or storage, they pass an inspection station.

Straight-line production methods are followed in branding and filling drums with the various products. Thus orders for a single product may be handled rapidly by one or more filling lines without mixing and subsequent sorting. With the full cooperation of the price and brand department, all drum markings are now placed on one head only. This policy alone has greatly speeded production by eliminating the physical upending of drums in the branding line.

With tare weight, gross weight, gallonage, brand, consignee, and other information stenciled on the brand head, drums continue to the filling location. At this point a number of advanced methods have been adapted in an automatic filling device designed and engineered by company personnel. Drums are tare weighed automatically before filling. Uniform gallonage is assured by automatic weight filling of drums. Filling speed has been increased through use of higher line pressures and foaming and spillage eliminated by undersurface filling.

Filling lines are readily purged to rundown tanks and switched from one to another of the several product lines leading to the filling location. Pumps have increased filling speed to an average of 31.2 drums per man-hour as compared with 5.3 drums per man-hour by former gravity filling.

COMPARISON STUDY OF DRUM FILLING OPERATION: OLD VS. NEW METHODS

	No. of operations		
Classification—	Old	New	Difference
Operations	25	17	8
Transportations	22	11	11
Inspections	4	2	2
Storage	1	1	0
Distance traveled (ft.)	1,775	1,210	565

Automatic tare scales are set to actuate solenoid valves in filling lines, providing uniform, accurate gallonage for each product. As the drum moves to the scale the operator zeros the scale to compensate for tare weight by pushing a start button. The drum is manually centered under the filling device and filling, begun by push button, continues automatically. The vertical filling nozzle is depressed to the bottom of the drum and the filling valve opens.

When the correct weight of oil is reached, the scale, preset for each blend, closes the filling-line valve and the nozzle is withdrawn from the barrel. A suction line extending to the base of the nozzle prevents dripping by removing all oil which adhered to the nozzle's exterior on withdrawal from the submerged position. Such oil, usually lost through overfilling or spillage, is reclaimed from the rundown tank. Both single and dual filling devices are under study and the latter is under consideration for the proposed installations. Each filling line terminates in a double-width roller conveyor where drums are automatically positioned for immediate pickup by drum-grab attachments on fork trucks.

Can Filling

Can filling and packaging, stepped up by installation of higher-speed and more fully automatic machinery in high-volume instances, have justified added investment. Two 1-qt. sanitary can lines with capacities of 200 and 120 cans per minute are in operation. Also installed are units for automatic filling, sealing, and closing of 1-qt. and 1-gal. oblong cans.

Standardization of cans, cases, and cartons will streamline filling operations. Cans are now purchased with only the Gargoyle and Mobiloil symbols imprinted on them. All remaining information is stenciled or printed on containers as they enter or leave the filling lines. The almost infinite combination of 900 brands and the names of 29 affiliated companies used in domestic and export shipments would result in an impossible storage and inventory problem if empty cans were stocked with such information preprinted by the can manufacturer.

Compounding and Blending

Modernization of compounding and blending facilities is now in the planning stage and flow charts are being prepared for new units. In general, major compounding will be done by the continuous method. Plans include the use of modern proportioning machinery for compounding additives. The layout of new lines is designed to afford maximum flexibility for blending and compounding a wide range of specialty oils to order. Preparation of stock blends in large volume will be largely automatic.

The over-all object in the department program is the ability to blend, package, and ship stock products within 3 days of receipt of orders. This will reduce the necessity for stockpiling packaged products in large quantities, and will allow more economic storage of oils as blend stocks. Standardization and simplification of brands and finished stocks are also under consideration as a further means of reducing operational costs.

Other Facilities

Engineers are now studying the economics of incorporating the slabbing, caking, and packaging of waxes into the department's operations.

New warehouse and dock facilities for domestic shipments are now completed. Stocking sufficient volumes of various products, the domestic shipping department will be prepared to fill truck and rail orders on short notice.

A new office has been established in the department area to centralize all operations. Newly equipped with modern business machines, it will expedite scheduling, shipping, and inventory and production control.

Completion of all proposed modernization next year will result in a model plant prepared to handle an extremely wide range of petroleum products for domestic or foreign markets. Higher efficiency will be combined with improved working conditions and greater safety for all operators.

Offshore Seismograph Work With Single Boat

(Continued from page 83)

a steel wire rope inside a plastic cover, and float in the water. In operation the charge is attached to an expendable float and to the end of the firing line and dropped overboard. The reel runs freely and the line pays out with little or no drag on the charge. When the charge reaches the center of the spread as determined by a mark on the firing line, the shot is fired. The firing line is then reeled in rapidly (at about 20 m.p.h.).

Just before the first shot is in firing position, the charge on the other side is dropped over, and when it reaches proper position, is fired. In actual operations, two shooters and a reel operator can easily carry on continuous shooting without assistance.

Because the hose or streamer type of receiver operates off bottom, has a very smooth outer surface, and zero weight in water, it does not wear and rarely catches on obstructions. Some sections have been in use for 12 months over 5,000 miles of bottom with no sign of wear or damage. Since it is pressure operated, it is nondirectional around its axis and requires no gymbals or other means to control the position of its elements.

Its towing weight is very low and it can be towed in long lengths at speeds up to 10 knots. If weather becomes too heavy, it can be reeled in easily in about 15 minutes.

The basic principle of the surveying

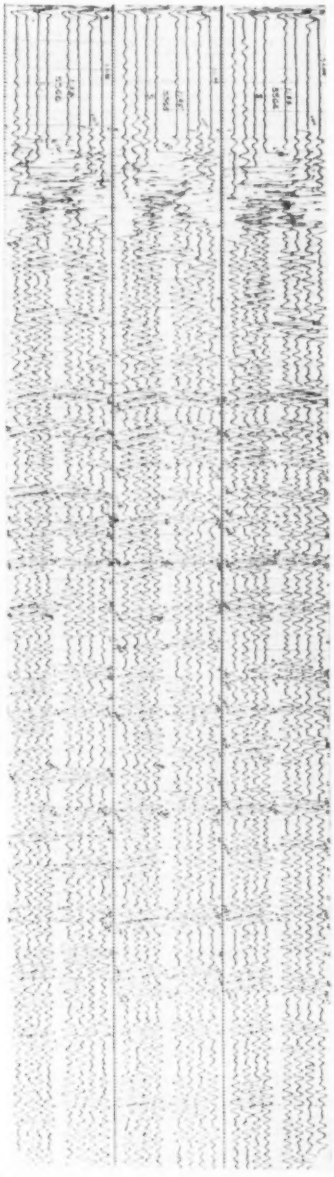

Fig. 7—Sample of a seismograph record from piezo-electric crystal-type seismometer inside hose.

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Swan-O-Tret down-the-hole treatment dissolves paraffin and keeps it in permanent suspension ***from the well to the refinery.***

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method used depends on the fact that under a given set of conditions, the speed of sound through water is accurately known. With the speed of sound known, if the travel time of a given sound from a known source to a given point can be determined accurately, the distance traveled by the sound can also be determined accurately.

Assuming that accurate distances are available, the problem can be stated this way. The positions of points A, B, C, D, etc., are known accurately. The positions of W, X, Y, Z, etc., are known approximately. The distances A-W, A-X, A-Y, A-Z, B-W, B-X, B-Y, B-Z, C-W, etc., are known accurately.

Question: Can the positions of W, X, Y, and Z be determined accurately from these data? **Answer:** Yes. How? By drawing arcs with radii equal to the accurate distances measured from sound speed. From each known point, A, B, C, etc., an arc of radius equal to the distance to point W is drawn through the approximate position of W. These arcs will intersect at the exact position of W. Continuing the same process will permit accurate location of positions X, Y, and Z.

The heart of the surveying system used by Marine with the single-boat shooting crew is the sonobuoy. This is a buoy which contains two elements; one a sensitive hydrophone which will pick up the sound of a shot fired in the water near the boat, and second a radio pulse transmitter which will be triggered by the arrival of the sound at the hydrophone. The time of the shot is accurately recorded on the boat, and the radio pulse is received on the boat. Since the travel time of the radio pulse is practically instantaneous, the time interval between the shot and radio pulse reception is the time it took the sound of the shot to travel from boat to the hydrophone in the buoy. From that time interval the distance to the buoy can be determined.

Fig. 3 shows the usual procedure in starting a survey of a new prospect, adjacent to land. The boat is anchored offshore from known land benchmarks, and position cut in by transit from the known shore locations, preferably at night. A sonobuoy is then dropped at that spot and the boat moves parallel to the shore some 5 to 10 miles, anchored and again the position is cut in from the land benchmarks. Then the second sonobuoy is dropped.

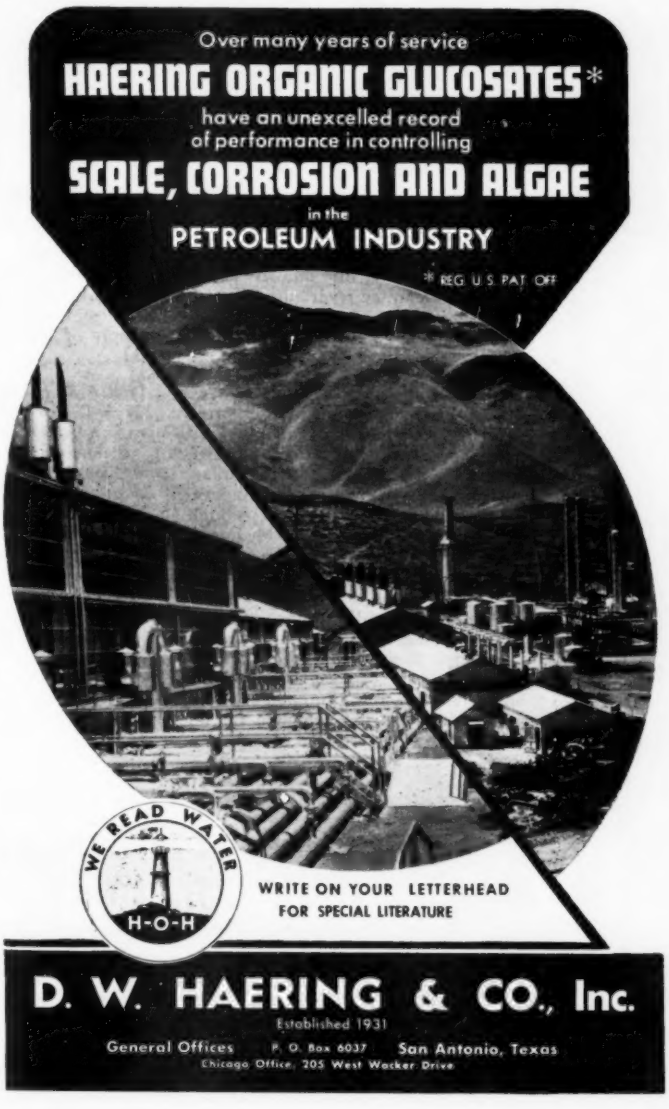
Several additional buoys are then dropped at strategic locations farther out in the area to be worked. The boat then returns and travels in a path between the known position sonobuoys and those dropped farther out. A series of location shots are fired along this path. Each shot gives a known position with reference to the known position sonobuoys and a distance radius to each unknown position sonobuoy. A series of arcs is drawn and the accurate position of the buoys farther out is determined. The party is then ready to start shooting.

As the work progresses, additional buoys are set out or moved at convenient periods a short time in advance of the shooting work and by plotting them in as the shooting proceeds, they are tied in with many cross fix points by the time they are needed. In general, five to seven buoys are sufficient for a prospect 15 by 25 miles, giving three to five out fixes over the area. The usual fix will tie to 20 ft. or better, and several surveys have been carried along as far as 110 miles and then tied back into shore positions with errors of 200 to 500 ft.

Study Distribution Costs

Distribution laboratories, in which the microscope is being put on costs of operations involved in moving gasoline, fuel oil, and other products, from the refinery to the ultimate consumer, has been inaugurated by Shell Oil Co.

The firm has 15 specially designated "pilot-plant depots" located in all parts of the country.



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Sources of Reservoir Data

IN order to analyze and control petroleum reservoirs and well systems it is necessary to have all the basic reservoir data at hand. The techniques of procuring such data are frequently open to discussion and criticism.

The data needed can be grouped as (1) physical properties of the reservoir, (2) physical character of the reservoir fluids, (3) static characteristics of the rock-fluid system, and (4) dynamic characteristics of the rock-fluid system.

There are several means of acquiring these data. Samples of the reservoir rock can be taken directly for the determination of rock properties and the over-all geometry of the reservoir. These rock samples may be available as well cuttings or cores. As an example of data acquired by this method, porosity and permeability are cited. Samples of the reservoir fluids at reservoir pressure and temperature can be taken or reservoir fluid samples can be obtained by recombining surface fluids in the proper ratio and subjecting the mixture to reservoir pressure and temperature. Gas solubility and oil shrinkage are data in this category.

Samples of the reservoir rock and the fluids separately do not give characteristics of the rock-fluid system. However, the reservoir rock samples obtained can be saturated with the reservoir fluids obtained or other fluids having similar properties to reconstruct the rock-fluids system. Only the static properties of this system can be studied or it can be subjected to such changes as will permit the observation of dynamic character. Static tests include capillary-pressure data and dynamic tests include relative-permeability measurements.

Basic to the determination of reservoir data by direct sampling is the procurement of a representative sample and its proper evaluation. Basic to the determination of rock-fluid properties, either static or dynamic, is the ability of the experimenter to duplicate the reservoir system exactly or in the proper dimensional ratio.

Another approach for gathering reservoir data is to measure the desired quantities on the reservoir in place by a direct or indirect method. All logging techniques come under this category. It is difficult by this approach to differentiate between properties of the rock and its fluids. Instead the rock-fluids system is studied as an entity. Also, by this approach static rather than dynamic character of the rock-fluids system is measured.

A logging technique embraces three separate phases. First, it is necessary to delineate the physical relationship between some desired property of the rock-fluids system and a measurable secondary physical property. Second, it is necessary to determine the secondary physical property by logging the well, and third, it is necessary to interpret the resulting measurement in terms of one or more coexisting rock-fluids systems.

As an example of data acquired by logging consider electrical resistivity. It is necessary (1) to know that a physical relationship exists between the resistivity of a porous medium and, for example, its connate-water content, (2) to measure a resistivity of the rock-fluids system that is free from other influences aside from connate water, and (3) to interpret the resistivity measured, not on an ideal or single rock-fluids system but on a complex grouping of such systems, to yield the desired information concerning connate water.

Any measurable physical property of the rock-fluids system is a proper logging measurement provided usable correlation can be found between this physical property and a quantity desired for engineering calculations.

Yet another approach is to acquire basic reservoir data from well tests. Data so acquired are subject to yet more variables than those from either of the two previously discussed sources. Not only is it impossible to differentiate between individual fluid or rock properties but it is also difficult to differentiate between properties of the rock-fluids system and properties of the reservoir-well system.

In this grouping of tests are the productivity index, well interference, or pressure-buildup tests. Such tests embrace three phases similar to the logging techniques. It is possible to show an ideal physical variation between a measured secondary quantity and desired reservoir data but the measurement of the secondary quantity and interpretation to yield the desired data becomes a difficult problem. Tests in this group are further complicated by the fact that they are not only tests of dynamic character but they are rarely steady-state tests.

None of these three sources of basic data can be looked upon as infallible. In a given situation it behooves the engineer to avail himself of as many sources of basic data as are possible. Data on a specific quantity obtained from the several sources may not be consistent. Such inconsistency may be due to personal error, which can usually be found and eliminated. Remaining inconsistencies are then due either to (1) unreliability of techniques or (2) ignorance of important factors in the interpretation of measurements which yield the data.

Frequently, therefore, it becomes necessary to judge between the worth of data arrived at from several avenues of approach and to choose that which is most probably correct. In doing this for reservoir data the engineer must be familiar with the details of different techniques, the assumptions on which they are based, the degree to which each technique has shown good performance in the past, and the situations in which the technique is reliable.

Experience has demonstrated that for some circumstances and purposes data obtained from cores are reliable and are in other places unreliable. The same applies to electrical logs or radioactive logs, or to subsurface fluid samples and to recombination samples. The same idea applies to other areas such as exploration. Gravimetric or magnetic exploration data each have their own areas of usefulness. The estimation of reserves by volumetric and material balance means requires also a knowledge of those regions in which either is uniquely adaptable.

In effect the problems of petroleum production are so complex that the engineer must avail himself to every possible tool and he must understand the proper design and use of each tool.

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, University of Oklahoma

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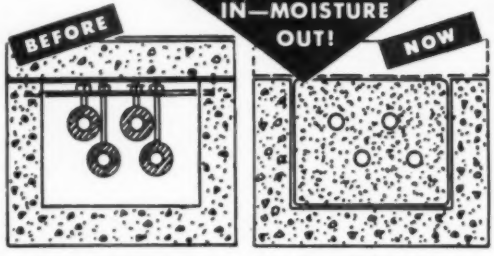

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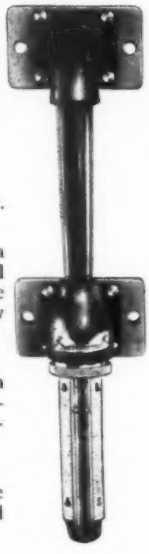

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Fig. 483 FLOGUIDE METER

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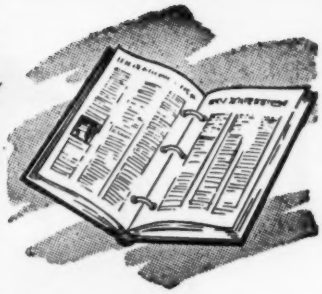
The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Application of Automatic Control*

WHEN we think of instrumenting a typical charge-stock heater. (Fig. 1) two variables come to mind—the rate of flow of charge to the heater and the outlet temperature of the heated charge. Why must these variables be reliably controlled? In the close coupling of process vessels as practiced in the modern refinery, there is a minimum of surge capacity allowed. This close coupling, of course, has a sound economic background. Why invest in extra tanks and vessels if, through the proper application of automatic controls, the need for these vessels can be overcome?

If reliable charge-stock flow control is omitted, observe what can happen. First of all, an unsteady flow of charge will make difficult or impossible accurate heater oulet temperature control. In most units, the charge picks up a substantial temperature rise by passing through several heat exchangers wherein product streams from fractionating towers or other vessels are cooled by the incoming charge. Suppose that the charge flow decreases. Less heat will be picked up by the charge from the product stream heater exchangers, leading to difficulties in tower operation. Obviously, too, a smaller charge flow will cause the charge to enter the heater at higher than design temperature. Because of comparatively long lags in the heater, the heater outlet temperature will run high, temporarily at least, further aggravating the upset condition.

If the heater outlet temperature goes higher than that required for optimum operation, fuel is wasted. But more important — a hot feed to a tower will cause excessive vapor temperatures, which in turn, will require considerably more reflux if side streams of the desired specifications are to be produced. More reflux means greater pumping costs and, of course, there is a limit to the quantity of reflux which can be used before the tower will choke. Conversely, if the outlet temperature is permitted to run lower than that required for optimum operation, the required separations in the tower will become difficult to obtain. Reflux requirements may be so small as to become uncontrollable, since the pumps and valves are designed for certain minimum flows below which operation is difficult or impossible.

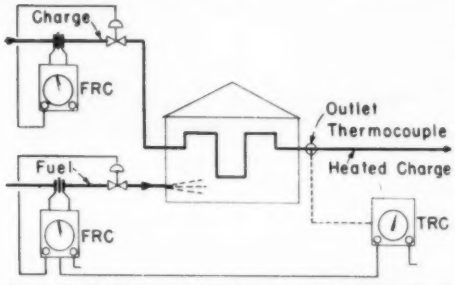
Temperature control of cracking furnaces, of course, is even much more critical than for the average heater. Operate the furnace a few degrees under the optimum temperature for the cracking reaction and the yield falls off. Operate the furnace a few degrees over optimum temperature and coking will occur in a very short time, causing costly down time and, of course, increased wear and tear on the furnace tubes because of turbining.

What is shown in Fig. 1 may be considered the very minimum in heater control. In Fig. 2 a cascade control system is shown. *(See The Refiner's Notebook, March 16, 1950).* The set point of the flow controller is continuously and automatically adjusted by the temperature controller. The system, which is used widely in the refining industry, must have some economic justification. What is it?

Fuel supply pressures are seldom constant—there are frequent fluctuations which mean that the quantity of fuel or B.t.u.'s going through the control valve for a given valve opening is not constant. These fluctuations may be due to the effects of voltage variations on the pumps, fuel viscosity or density changes, or clogging tendencies of the burner ports. Take the case of less fuel going through the valve for a given opening. Obviously, less fuel is going to cause a drop in heater temperature. This temperature change, as reflected at the heater outlet, may be several minutes developing. By the time this drop in temperature is detected at the outlet, the damage has been done, since the large heat capacity which works in our favor in maintaining the outlet temperature steady for awhile, even though fewer B.t.u.'s were being injected into the heater, will now work in our disfavor. It will now take a considerable time for the effects of a new valve setting to be felt at the heater outlet. Such conditions will cause a cycling about the control point, a condition damaging to the process.

The additional flow meter compensates for these flow supply pressure variations and permits the temperature controller to do a much better job.

*Portion of paper, "Petroleum-Refinery Instrumentation," by D. M. Considine, Minneapolis-Honeywell Regulator Co., presented at the thirty-eighth annual meeting of the Western Petroleum Refiners Association, San Antonio.



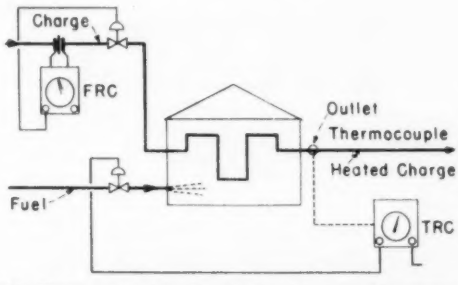


Fig. 1—(Left) Minimum control for a refinery heater. Fig. 2—(Right) Closer control is achieved through a cascade system.

No. 15 in current series. The Refiner's Notebook has been published continuously since 1944

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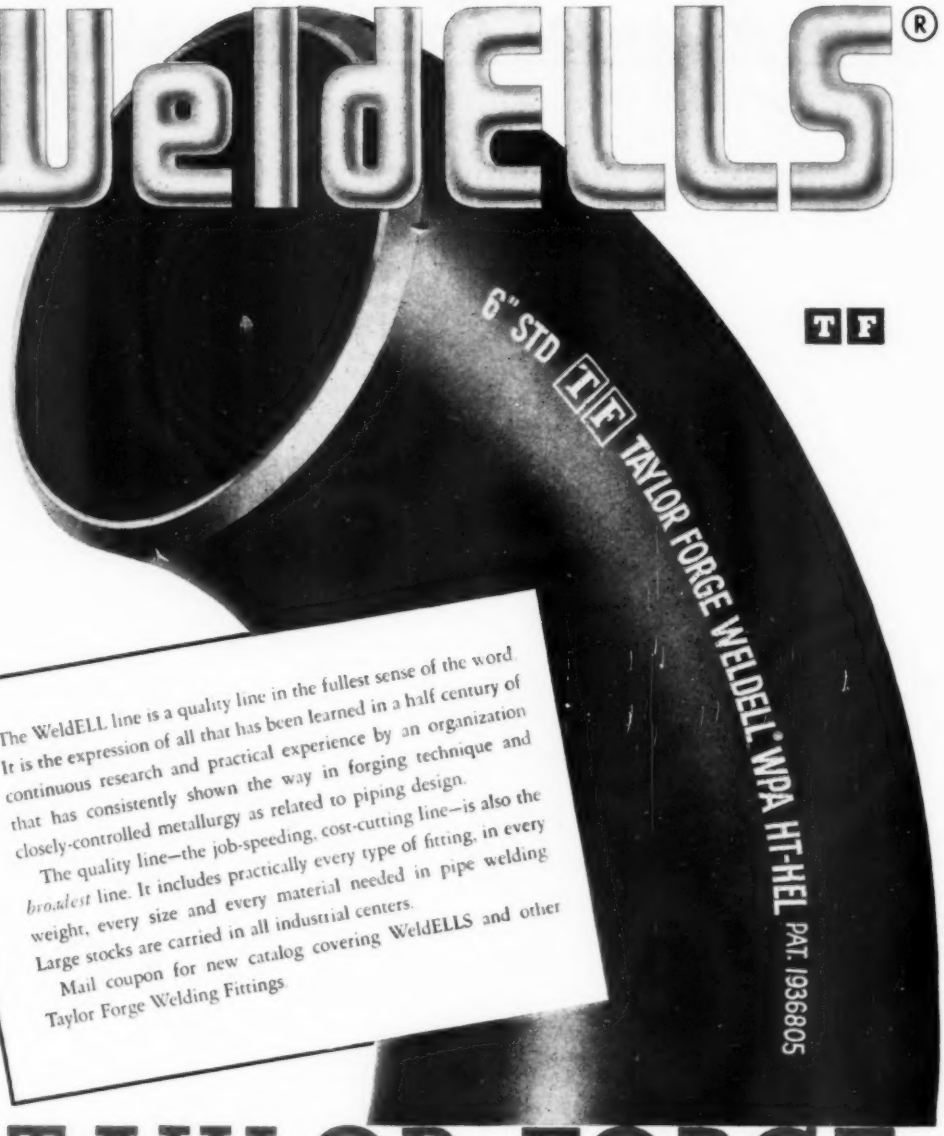

The WeldELL line is a quality line in the fullest sense of the word. It is the expression of all that has been learned in a half century of continuous research and practical experience by an organization that has consistently shown the way in forging technique and closely-controlled metallurgy as related to piping design.

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OIL AND GAS EQUIPMENT Digest

IT'S NEW — CHECK IT

TRADE LITERATURE

1 GOETZE METALLIC GASKETS is essentially a gasket selection sheet. It lists 32 basic designs of metallic gaskets. *Johns-Manville.*

2 HYDROCRANE describes a 2 and 3-ton truck-mounted, completely hydraulic, all purpose crane, with telescoping boom. Accessories are trash bucket, catch-basin bucket, magnet, three-tine grapple, and digging clamshell. Boom hoist, load hoist, boom telescope, outriggers, buckets, and swing of upper deck are all hydraulically controlled from operator's station. *Bucyrus-Erie Co.*

3 EAGLE TANK-BOTTOM AND INTERMEDIATE SAMPLER is a data sheet on this improved instrument. The sheet includes description, operation, time immersion, volume, efficiency, and precautions. *K. D. G. Instruments, Ltd.*

4 FIREPROOFING CEMENT. This two-color, eight-page brochure presents results of fire tests, application data, illustrations of industrial installations, and fire-resistance ratings. *Eagle-Picher Sales Co.*

5 SELF-PROPELLED COMPRESSORS. Bulletin NEU-50 describes the Pneumatractor, Models 60 and 105. The Pneumatractor is a tractor-compressor combination powered with the standard model 60 Unistage or the 105 Pneumapower compressor. *Schramm, Inc.*

6 HOW TO CONTROL CORROSION WITH CARLON PLASTIC PIPE. This new eight-page brochure is fully illustrated and shows the applications and advantages of plastic pipe in oilfield applications. *Green Contracting & Engineering Co., Inc.*

7 HOW TO GET JUNK OUT OF THE HOLE is completely illustrated and described in the new junk catcher folder. The Globe patented junk catcher is an all-around emergency tool that pays off three ways. It drills, reams side well to gage, and recovers junk. *Globe Oil Tools Co.*

8 PEERLESS LINE SEPARATORS. A four-page, two-color bulletin explains the Peerless line separator principle, shows a cutaway view of a line separator, and pictures typical installations. *Peerless Manufacturing Co.*

9 SCREW AND BOLT HANDBOOK AND CATALOG is designed for the easy use of engineer and purchasing agent. Tab indexed and well illustrated with headed and threaded products labeled, this book covers a wide range of standards and specials in every-day industrial use. Plastic bound, this handbook contains over 100 pages of tables, data, and illustrations. *St. Louis Screw & Bolt Co.*

10 INDICATING AND RECORDING THERMOMETERS, a four-page brochure, covers a line of recording and indicating thermometers available in temperature ranges from minus 40° to plus 500° F. Each instru-

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, April 13, 1950

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ment is illustrated and complete technical data are given in tabular form. *Electric Auto-Lite Co.*

11 CLAMPS-STRAPS-COUPLINGS is an illustrated folder describing V-band and ventilated couplings for all types of flanged joints; channel-band couplings to join beaded tubes or ducts, and a line of clamps and straps. *Marman Products Co., Inc.*

12 STUFFINGBOXLESS PUMPS. Folder No. 107 lists 12 important reasons why you can profit by using stuffingboxless pumps. These explosionproof and leakproof pumps can be furnished for any suction or pumping pressure. *Bingham Pump Co.*

13 WICHITA WATER PUMP. Bulletin No. 102 is a four-page data sheet on a water pump with friction drive. A sectional drawing illustrates important features. *Wichita Falls Foundry & Machine Co.*

14 HARDHED DIAMOND OIL-WELL BITS. This 30-page catalog is sectionalized under the following main headings: bit prices, barrel prices, rental charges, single-tube equipment, and instruction manual for diamond coring in oil fields. *Diamond Oil Well Drilling Co.*

15 NEWHALL BRANDED BOLTS. Not only does this 42-page catalog list dimensions of all standard bolts and nuts in tabular form, but it includes results of izod impact test, Brinell hardness tests, bend tests, and microscopic examinations, and illustrates each step in the production of nuts and bolts. *A. P. Newall & Co., Ltd.*

16 SPUDDER MODEL C-34 is an eight-page folder illustrating the important features of a spudder capable of handling any job which any 5,000-ft. servicing unit, top-to-bottom spudder, or cleanout machine can handle. *Walker-Neer Machine Co.*

17 PRESSURE TEMPERATURE FLOW SURVEYS describes the service and illustrates the equipment used in accurately determining the pressure, temperature, and flow conditions in a well. The reservoir engineer is able to observe these conditions at any number of stations and any number of production rates in a single run. *Byron Jackson Co.*

18 MORRIS-COMMERCIAL VEHICLES features the structural details of trucks ranging in capacities from 10 cwt. to 5 tons. These trucks are equipped with either gasoline or diesel engines and are designed for heavy industry. *Nuffield Exports, Ltd.*

19 PURIFICATION AND DEHYDRATION OF GASSES. This paper covers the chemistry and chemical engineering and regenerative process for removing hydrogen sulfide and carbon dioxide from gases by use of amine process together with their subsequent or simultaneous dehydration. *Fluor Corp., Ltd.*

20 BULLETIN MS-20-B describes 2 by 4-ft. and 3 by 4-ft. dual and single-unit mud screens, used mainly for shallow and medium-drilling operations; and the 4½ by 5-ft. heavy-duty mud screen for deep-drilling operations. *Overstrom & Sons.*

21 YOUR DRILLING RECORD AS TRUE AS A PLUMB presents in concise, indexed form, an advanced technique for obtaining a graphic, accurate drilling record for use by geologist, engineer, and superintendent. Contains information on well logging, continuous core analysis, and oil fluorescence detector services. *Rotary Engineering Co., Inc.*

22 HYDROSTATIC LIQUID CONTENTS GAGE is a data sheet on continuous remote-reading gages for industrial installations. The sheet covers applications, advantages, operation, and appearance. *K. D. G. Instruments, Ltd.*

23 PIONEERS OF SCIENTIFIC FILTRATION. This multicolor catalog covers a complete line of sizes of air, lubricating, and fuel-oil filters, pipe-line filters, dust-recovery filters, silencers, flame traps, and dampers. *Vokes, Ltd.*

24 ALL-CUPROUS, STANDARD EXCHANGER. The bulletin features the bronze bonnet and hub, the copper shell, brass baffle plates, seamless admiralty tubes, and removable zinc corrosion arresters, of the type BCP exchangers. *Ross Heater & Manufacturing Co., Inc.*

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OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by Dan B. Miller

25 5½-IN. FLOAT SHOES AND FLOAT COLLARS. One-piece valve assemblies are entirely surrounded by the cement plug. This construction provides greater support for the valve and adds to resistance against washouts, preventing possibility of the valve collapsing and shutting off circulation while displacing cement. Live-rubber seats, molded into the plastic assembly will not wash out under high displacement pressures. Other float shoes and collars, up to 13⅜ in. o.d., have identical features of design and construction. *Davis-Lynch Sales & Engineering Co.*

IT'S NEW CHECK IT

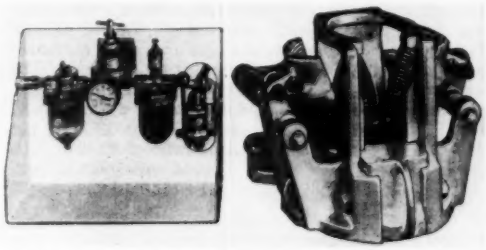
26 LOR-ANN COMBUSTIBLE GAS DETECTOR AND SAFETY CONTROLLER. Underwriters' Laboratories have approved this combustible gas detector and safety controller which provides the required protection against the hazardous conditions brought about by a relatively low ratio of vapor or gas to air. The instrument continuously samples the atmosphere and gives warning long before conditions reach the explosive stage. Incident with the gas warning signal, both audible and visible, it will instantly take over the control of the ventilating system, fire-fighting system, or other precautionary appliances, and will automatically stop the production machinery. *Lor-Ann Instrument Co.*

IT'S NEW CHECK IT

27 NEW MINIATURE SEISMOGRAPH INSTRUMENTS. Type PSU-11 is designed around the GA-11 amplifier. The waterproof amplifier case measures 6 by 13 by 21 in., weighs approximately 35 lb., and contains 12 type GA-11 amplifiers plus the control unit. Amplifier specifications: gain, 120 db. (1,000,000), no preamplifiers are necessary; filtering, two-section LC filter for low-frequency rejection, one-section LC filter for high-frequency rejection; AGC, operates over unusually wide range; initial suppression, individually adjustable; amplifier controls, gain control, amplitude control, suppression control, and filter selectors. Amplifiers are plug-in type. Oscillograph specifications: 25 traces; 6-in. paper; barrel-type electromagnetically damped galvanometers; viewing screen; built-in timing system; built-in paper knife; removable takeup magazine; governor-controlled cranking motor. *Southwestern Industrial Electronic Co.*

IT'S NEW CHECK IT

28 AIR-POWERED TUBING SPIDER. A portable metal case houses a filter, pressure regulator, lubricator, and a control valve. For permanent installation the valve is designed so that it may be installed at the hoist operator's position. Where desired, a foot-operated valve



The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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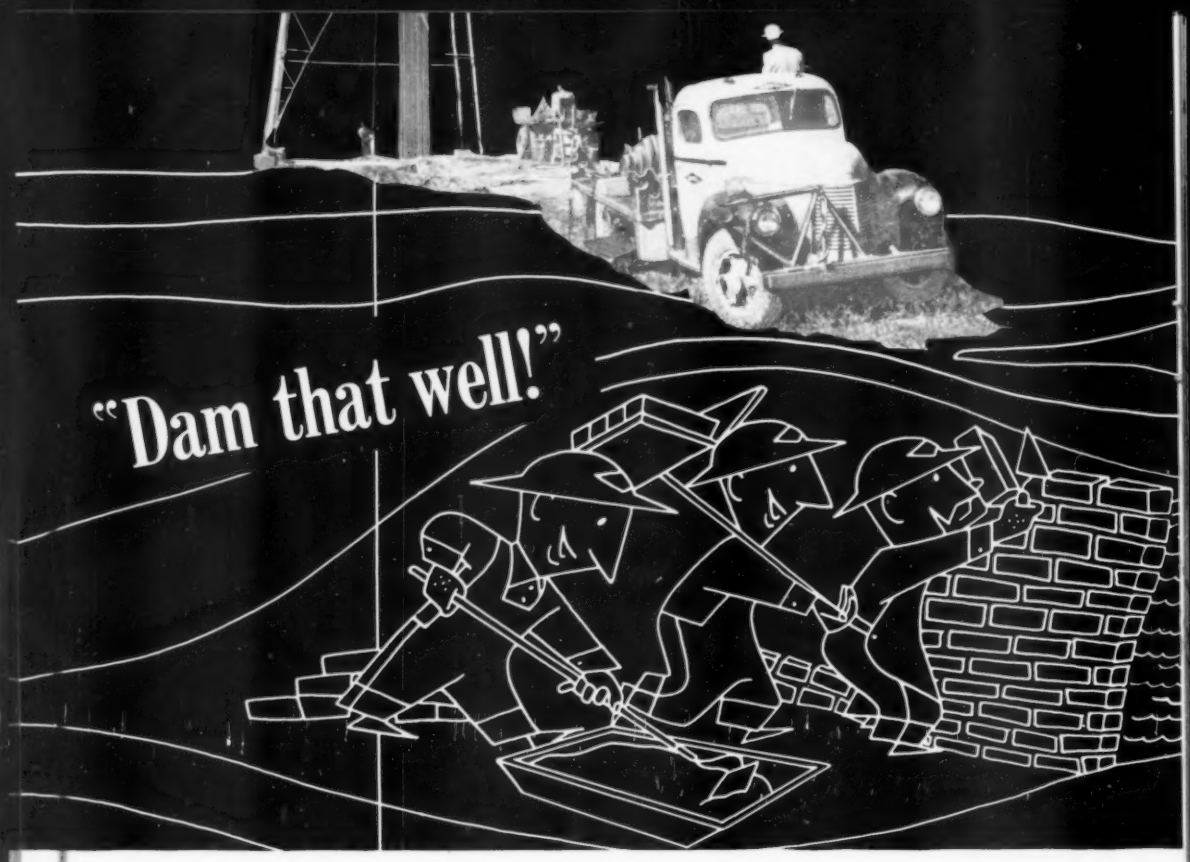

DOWELL PLASTIC SERVICE has been used successfully in the reconditioning of hundreds of wells

Control of water and gas encroachment poses a vital problem in many old wells. On a recent job, Dowell Electric Pilot Surveys revealed areas of gas and water encroachment that were choking off production on a well. The well was then plugged back 20 feet with plastic, and plastic was squeezed around the casing shoe. Result? *Before* remedial work, oil production was 12 bbls. per day with 90% water and a gas-oil ratio of 20,000 cu. ft. per bbl. *After Dowell Service*, oil production was 50 bbls. per day with only 30% water and a gas-oil ratio of 3700 cu. ft. per bbl.

Dowell Plastics have proved themselves ideal for many workover and recompletion jobs. If necessary, the Dowell Electric Pilot is used to determine the well's permeability profile and the sources of fluid entrance. Then, the Dowell engineer uses a specially engineered bailer to spot the plastic in the right place. The plastic enters the well as a fluid . . . then becomes an impervious solid at a predetermined time. Dowell plastics provide excellent bonding and penetrating qualities that form a permanent dam against encroaching fluids.

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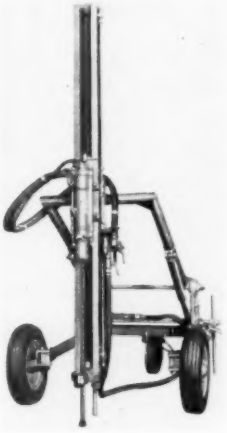
with guard may be supplied and worked either by the hoist operator or a floor man. Actuating air cylinder is mounted on the back side of the spider body. Connection between the valve and the air cylinder is by small hoses with quick-change couplings. It is impossible to drop a string of tubing when the slips are in position against the tubing, as the pressure exerted causes the slips to ride the pipe at all times. *Advance Oil Tool Co.*

IT'S NEW CHECK IT

29 WAGON DRILL, WDR-126. This tool is equipped with a 4-in. drifter and will drill holes at any angle, in any direction, to a depth of 24 ft. or more. It will drill flat holes at any point from 2 in. to 9 ft. aboveground. The air feed is continuous; it is never necessary to slide a guide shell or change the setup by hand in order to get a full steel change. The WDR-126 will blow any hole clean. Another feature is a built-in twin jack-screw mechanism through which the U bar is raised or lowered to desired position. Main wheels swivel 90° for line drilling and 180° to obtain a narrow tread and permit the machine to be operated in confined spaces. *Schramm, Inc.*



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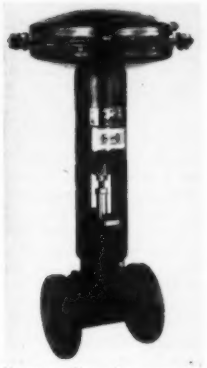


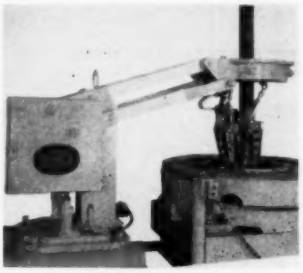
30 2,000 SERIES SAUNDERS PATENT DIAPHRAGM CONTROL VALVE is available for any size up to 12 in. It is designed primarily to handle corrosive fluids or gases or any slurry or fluid carrying solids in suspension. Also useful on many vacuum applications. Valves are packless as a rubber or other plastic diaphragm is retained between the bonnet and valve body. A compressor or foot is attached to the upper side of the valve-body diaphragm. Tight shutoff is obtained when the diaphragm is brought firmly in contact with the weir. Its flow characteristic is linear. Can be supplied for normally open, normally closed, or on-and-off action. *Hammel-Dahl Co.*

IT'S NEW CHECK IT

31 TUBING SAFETY JOINT features positive release for stuck tools. It minimizes the problem of bad sanding and gives a point of ready and positive release for tubing recovery. A new locking method permits full torque in either direction without backing off. Shear pins take none of the torsional load. Safety joints hold until you want to release, then shear quickly and cleanly by pull, by differential pressure, or a combination of both. Available in 2 or 2½-in. bore. Joint is made for right-hand release and will hold pressure even after the pins are sheared. Outside diameter is exceptionally small and the joint material is not heat treated, lending itself well to fishing-tool recovery. *Guiberson Corp.*

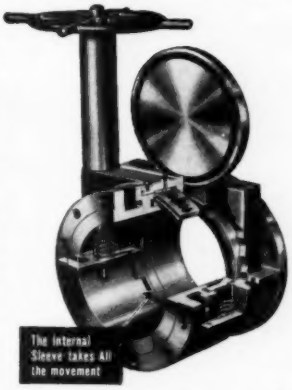
IT'S NEW CHECK IT

32 VARCO POWER SLIP is a simple and ruggedly constructed production tool. It can be operated efficiently on only 30 to 40-psi. air pressure. The power slip can be operated manually without change, should the air fail. Since slips work on low pressure, the elevator may push the slips into the master bushing, permitting the tool joint to get as low as possible above the rotary table, thereby minimizing the possible bending of drill pipe by tongs. Slip assembly being mounted on a revolving ring which turns on ball-bearing-mounted rollers, the slips can revolve freely with the table when breaking out. Drill pipe is automatically centered as air is applied and the slips set. *Abegg & Reinhold Co.*



IT'S NEW CHECK IT

33 RIGID LINE BLIND VALVES utilize an internal sliding sleeve to seal against and release the spectacle plate without movement or expansion of the pipe line. The sleeve is moved against or away from the plate by means of a ball-bearing mounted ring gear actuated by turning the hand wheel. Operation is not affected by misalignment or expansion and contraction of the pipe line. Especially suitable for all inflexible piping installations, such as those in oil tankers and barges, petroleum refineries and process plants, and for large-diameter lines. All parts are steel except the ring gear, which is high-tensile bronze. Working parts are enclosed, packed in lubricant, and sealed. Available in A.S.A. 150 and 300-lb. classes in sizes from 6 to 12-in. *Hamer Oil Tool Co.*



IT'S NEW CHECK IT

34 TEMPCHEK, a new improved heat insulation in pipe covering and block form for temperatures to 1,500° F. consists of silicas, combined with asbestos fibers and bonding agents. It is highly efficient, easily workable,

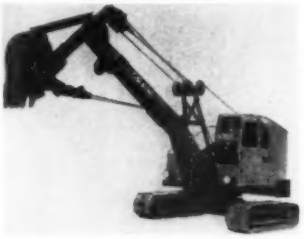
forms tight joints, is nonirritating, easy to apply, noncorrosive, rugged and permanent. Recommended for insulating superheated steam equipment in high-temperature, high-pressure power plants and for high-temperature surfaces such as oil stills, ovens, boiler walls, breechings, furnaces, and other equipment. *Philip Carey Manufacturing Co.*

IT'S NEW CHECK IT

35 SPECIAL GAS MASK FOR WELDERS. To protect welders on jobs where there are hazardous gases or smokes due to product residue or vaporization, can be used interchangeably with dust and fume canister or a compressed-air supply unit. Advantages include greater vision; lenses in shades from 4 to 12; complete gas-mask protection to reduce headaches, fatigue, and other health hazards; easy fit and comfort; free breathing; replacable welding hood; and interchangeable air supply to meet different conditions. *Acme Protection Equipment Co.*

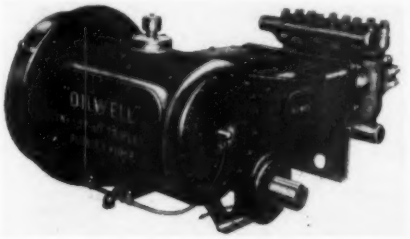
IT'S NEW CHECK IT

36 LORAIN PIPELINERS. The Pipeliner Junior is in the ¾-yard class and is designed around the Lorain TL-25 turntable. The crawler is extra-wide gage; 11 ft. 8 in. over-all and 8-ft. inside span between treads. When used as a crane, the extra-wide crawler provides over 12 per cent more crane-lifting capacities for full-circle operation. Easier operating of positive tread and travel lock and a clevis attached to the crawler frame for winch cable attachment on excessively steep grades are other features. Front end interchangeability is provided from hoe to shovel, crane, clam shell, or dragline. The Pipeliner Senior is in the 1-yard class mounted on a single-speed crawler 12 ft. long and 13 in. wide with a clear 8-ft. inside span between treads. Steering and tread locks are air-operated. Hydraulic coupling power takeoff prevents engine stalling, and reduces maintenance by acting as a shock absorber. *Thew Shovel Co.*



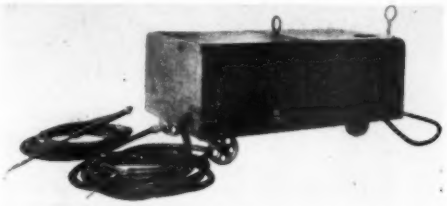
IT'S NEW CHECK IT

37 TRIPLEX PLUNGER POWER PUMPS. The new Oilwell No. 48P-HD and No. 58P-HD triplex plunger power pumps are horizontal, three-cylinder, single-acting pumps designed for cementing and acidizing operation as well as handling oil, water, and other liquids at high pressure. Both pumps have an 8-in. stroke; the No. 48P-HD using a 4-in. plunger and the No. 58P-HD a 5-in. plunger. Their extreme light weight of less than 19 lb. per horsepower makes these pumps ideally suited for truck mounting. Because of their compact construction, they can be mounted either crosswise or lengthwise on the truck bed. Their underslung pinion shaft permits close connection with the truck power takeoff. With a 310-hp. input for either pump, the No. 48P-HD has a rated stalling discharge working pressure of 12,000 psi. when connected through a torque-converter drive; the No. 58P-HD, one of 6,500 psi. *Oil Well Supply Co.*



IT'S NEW CHECK IT

38 ALL-ELECTRIC STEAM CLEANER designed especially for use wherever gaseous or explosive mixtures have previously made cleaning impractical. Is electrically heated and electrically powered. It removes grease, dirt, and other deposits from machinery, equipment, and floors, 10 times faster than by hand methods. The unit properly mixes a constant amount of water with the desired amount of dissolving cleaning compound, and pumps the mixture through a manifold where it is electrically heated in progressive stages. At 100 to 120 lb. normal operating pressure, the boiling-hot solution and vapor are ejected from the cleaning gun in a powerful 60 gal. per hour blast that cuts, dissolves, and flushes away the heaviest dirt and grease deposits. *Homestead Valve Manufacturing Co.*



IT'S NEW CHECK IT

39 STAINLESS STEEL MICRO-BELLOWS PUMP. Primarily developed for laboratory-scale pumping of materials which are liquid at room temperatures, it can be adapted to pump low-boiling liquids such as pentane and melted solids, and viscous materials. It is a pulsation-type pump which delivers a constant rate over long periods of time. The rate is variable depending upon the size of bellows and position of the adjusting nut. The pump has no packing gland or stuffing box, eliminating all dangers of contamination of product by lubricants. Rate with ½-in. bellows is 15-1,000 ml. per hour and with a ¾-in. bellows, 30-2,000 ml. per hour. *Research Appliance Co.*

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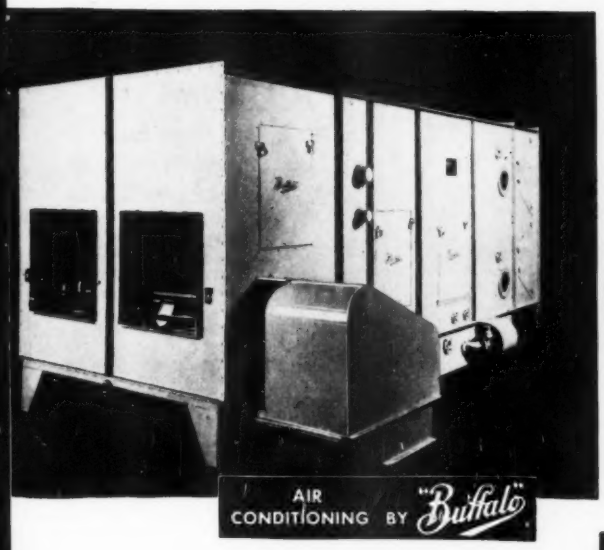

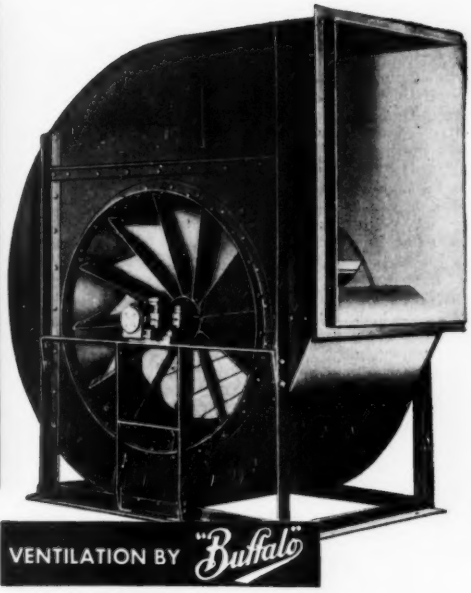

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A.S.T.M. Standards

Sampling, measurement methods are announced

NEW methods of sampling natural gas, and a method for measuring water-vapor content of fuel gases recently were completed by American Society for Testing Materials' Committee D-3 on Gaseous Fuels. The two new methods will be companion standards to the three A.S.T.M. standards now available which cover detail procedures for Calorific Value by the Water-Flow Calorimeter (D900-48), Specific Gravity of Gaseous Fuels (D1070-49T), and Methods for Measurement of Gaseous Fuel Samples (D1071-49T).

The methods of sampling natural gas have been completed after several years' study. They cover procedures for the sampling of natural gas containing different gases as contaminants such as (1) natural gases containing primarily hydrocarbons and nitrogen, (2) natural gases containing hydrogen sulfide, or organic sulfur contaminants, (3) natural gases containing carbon dioxide, (4) natural gas containing gasoline and condensibles. The differences in procedures are mainly in degree rather than in time.

The method contains information regarding the size of sample to be used for the following determinations: (a)chemical-gas analysis; (b) specific gravity with balance-type instruments; (c) heating-value determination; (d) hydrogen sulfide by Tutwiler method; (e) hydrogen sulfide by cadmium sulfate method; (f) referee sulfur; (g) gasoline content; (h) fractionation analysis; and (i) superexpansibility tests. These methods of sampling natural gas after approval by letter ballot of Committee D-3 will be submitted to the society for publication.

The method for measuring the water-vapor content of fuel gases by the dew point method was approved for submission to letter ballot for publication as tentative. This method determines the water-vapor content of fuel gasas by the water dew-point temperature of the gas. It applies generally to any properly constructed type of dew-point instrument, but the specific construction and operational features of the U. S. Bureau of Mines type of dew-point instrument are referred to as illustrative. The test is limited to gases whose water dew-point temperature at the test pressure is not lower than the hydrocarbon dew-point temperature of the gas at the test pressure.

The range of water-vapor contents covered by the method theoretically is from 0 to 100 per cent saturation. Practically, it is limited by the dew-point testing equipment used and under the requirements prescribed is arbitrarily limited (1) to conditions where the water dew point is at least 3° F. lower than the temperature of the source-gas pipe line or container and the ambient temperature of the testing equipment including all pipe lines leading the gas from the gas source to the testing equipment, and (2) to conditions where the determined dew point is not lower than 0° F.

Expansion Authorized

WASHINGTON.—New York State Natural Gas Corp., New York City, has been authorized by Federal Power Commission to expand its existing natural-gas transmission system and underground storage facilities to enable it to meet requirements of its present customers in New York State and Pennsylvania for the years 1951-1954 inclusive.

The construction program, estimated to cost $2,592,582, includes 53.5 miles of 16-in. loop line in Pennsylvania extending from a compressor station in Greene County to another station in Westmoreland County. In addition, the company will replace several sections of pipe at two storage pools, one in Tioga County, and the other in Potter County, Pennsylvania.

Line Approved

200-mile link to be built by Commonwealth Natural

WASHINGTON.—An order was issued by the Federal Power Commission last week authorizing Commonwealth Natural Gas Corp., Lynchburg, Va., to construct a 200-mile natural-gas line which will serve markets in Virginia, including the cities of Richmond and Norfolk.

FPC in a concurrent order denied the portion of the application of Piedmont Natural Gas Corp., Spartanburg, S. C., which proposed to serve markets in the tidewater area of Virginia, but reopened that proceeding insofar as it relates to the company's plans to supply natural gas to the Piedmont region of the Carolinas.

Virginia Gas Transmission Corp. was authorized to deliver and sell 55,000,000 cu. ft. of gas daily to Commonwealth, and in addition, Tennessee Gas Transmission Co., Houston, was authorized to sell 20,000,000,000 cu. ft. of gas yearly to United Fuel Gas Co. for resale to Virginia Gas, to enable the latter firm to supply Commonwealth's requirements.

The project will cost $6,425,000, and will connect with Virginia Gas' system in Greene County, Virginia, and extend to Norfolk and Newport News. The latter company will construct a measuring and regulating station at the connection point. Construction was directed to begin by July 1.

NEW COMPRESSOR STATION.—Above is the new natural-gas pipe line compressor station of Kansas Power & Light Co. at Ulysses, Kans., which began in January. Equipped with four 1,100-hp. horizontal compressors, the station serves the cities of Hutchinson, Salina, and Topeka.

Natural Gasoline

L.P.G. Convention

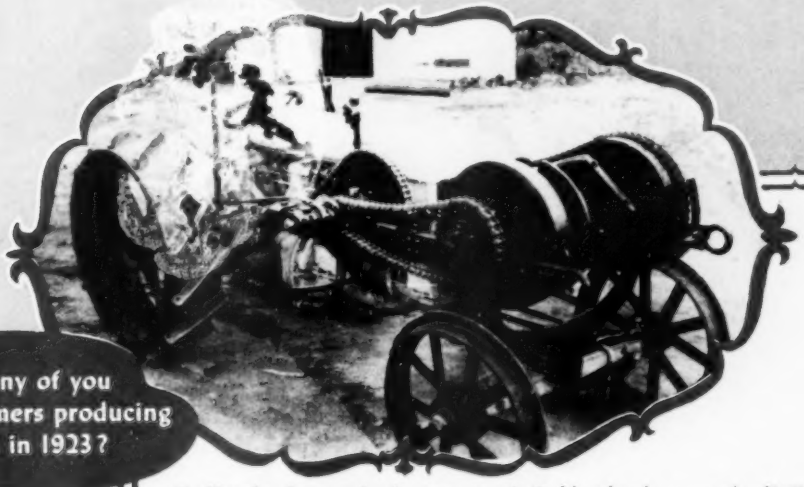
CHICAGO.—Open forums and round-table discussions of mutual problems of the liquefied petroleum gas industry will be featured at sessions of the producers, utilities, and international sections of the convention and trade show of Liquefied Petroleum Gas Association, which meets here May 8-11.

Adm. Louis Denfeld, former chief of naval operations, will be among speakers scheduled to address the convention, which will be held at the Palmer House.

The trade show will feature latest in L.P. gas appliances and equipment.

....REMEMBER.....

THE FIRST WILSON WINCH?



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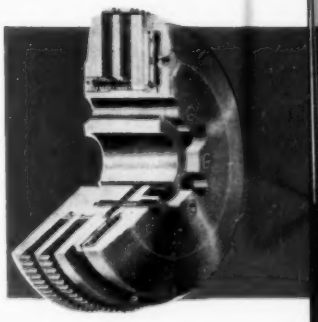

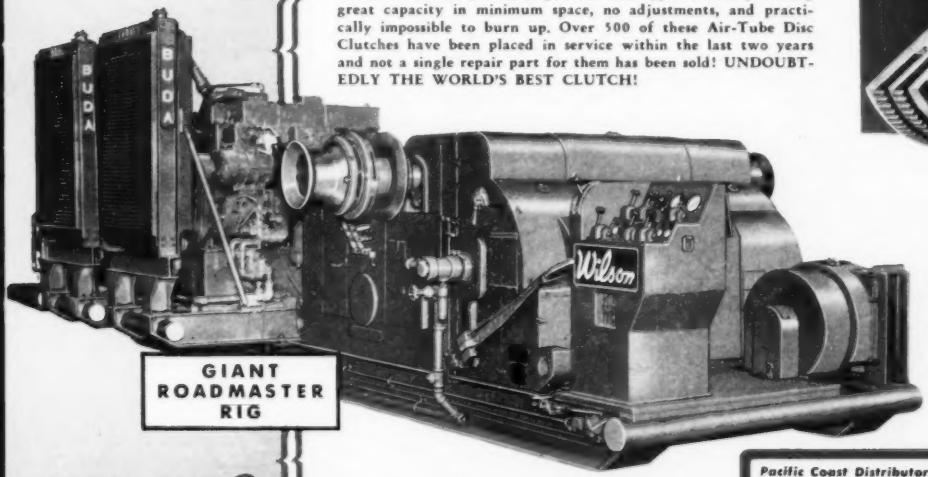

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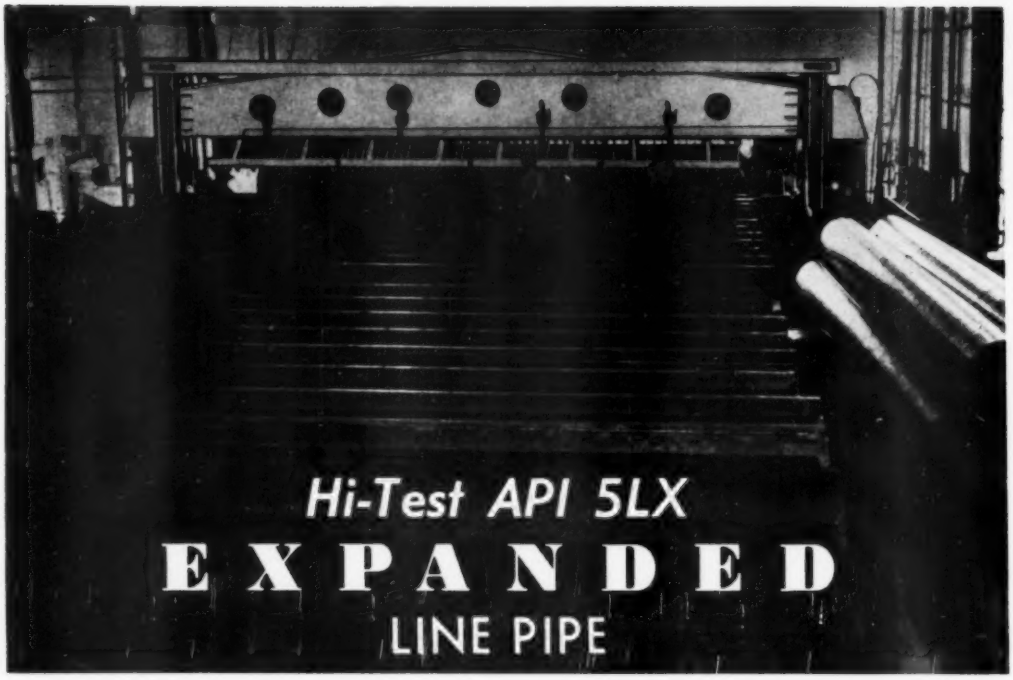

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Now Operating 85% Capacity

The new No. 2 Pipe Mill at Master Tank & Welding is now producing 17 cars a day of Hi-Test Expanded Line Pipe by the roll process. The normal plant capacity is rated conservatively at 20 cars a day.

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Plant Number 1 can produce 10 cars of pipe by the press method. If your job warrants greater production, the capacity of both plants can be greatly increased within a matter of days.

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PIPE LINES

Capacity Increase

Great Lakes to take more products through system

KANSAS CITY, Mo.—An additional 1,000,000 bbl. of petroleum products will be accepted this month by Great Lakes Pipe Line Co. from its shippers, consigned to delivery terminals at Kansas City, Kans., Des Moines, and Mason City, Iowa, and Mankato and Minneapolis, Minn., the company announced here last week.

The increased capacity was revealed in connection with a listing of construction progress on the firm's $55,000,000 expansion program, and represents the first use of any of the newly constructed facilities.

New lines completed.—Now completed are the 12-in. lines from Ponca City and Tulsa to Barnsdall, Okla., and the single 12-in. line from Barnsdall to the Kaw River at Kansas City, Kans. Work is going forward on the section from the Kaw River through the congested industrial area of Kansas City, Kans., to the company terminal in the Fairfax district. Completion is expected soon.

The 12-in. line from Kansas City will reach Des Moines by April 15. One section north of Des Moines, the 112 miles to Mason City, was completed earlier and has been in operation since March 31. Its use has increased line capacity to terminals north of Des Moines as gasoline has been pumped through the 12-in. to Mason City and the two existing 6-in. lines have been used solely for pumping to Mankato and Minneapolis.

The 12-in. line is expected into Minneapolis by April 15. Operation of temporary pumping facilities at Ponca City, Tulsa, Kansas City, and Des Moines will permit transportation of 1,000,000 bbl. a month above existing system capacity.

Shipments to terminals served by the 12-in. line can be increased approximately another 800,000 bbl. a month when permanent pumping installations are made.

From Kansas City a 12-in. line is being built northwest to Irvington, a station adjacent to Omaha. When this section is completed in the middle of May, shippers will have an option of consigning 250,000 bbl. a month of the increased capacity to Omaha instead of moving the entire volume to terminals north of Kansas City.

From Omaha the 12-in. line will be laid northward to terminals at Sioux City, Iowa, and to Sioux Falls, S. D. North of Sioux Falls capacity will be gained by construction of a new pumping station at Pipestone, Minn., permitting 50-mile pumping on all sections of the existing 8-in. line into Alexandria, Minn., and on the 6-in. line from there to Fargo, N. D., with Fargo pumping to Grand Forks, N. D. Delivery schedules of equipment for the Pipestone station will permit it to be placed in operation July 15, coincidental with laying of the 12-in. line into Sioux Falls.

Also currently under construction is an 8-in. line from Cushing and Drumright, Okla., into Tulsa which will be finished by April 15, giving pipe-line capacity to refineries in this area and to those on a connecting line south of Drumright.

New lines planned.—A second 12-in. line will be constructed between Barnsdall, Okla., and Kansas City, Kans., and pumping stations will be further enlarged at Barnsdall and Humboldt, Kans. The new line will parallel the 12-in. recently completed and three existing 8-in. lines. Construction will commence as soon as pipe can be delivered, and completion is anticipated sometime this fall. Cost of the line and station enlargement is listed at $6,629,890.

The projected line will equalize capacity of the two 12-in. lines into Barnsdall with two lines of similar capacity out of Kansas City, one north to Minneapolis, Minn., and the other northwest to Sioux Falls, S. D.

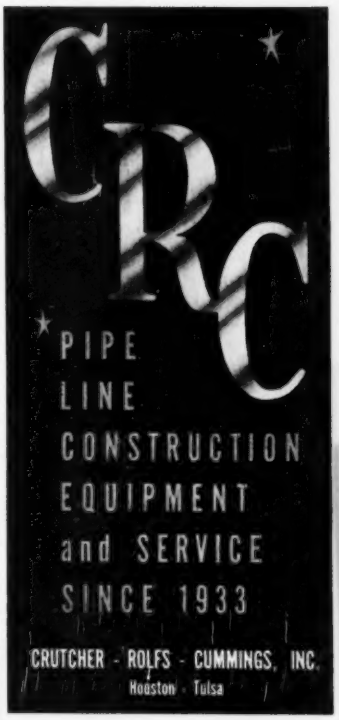
Additional storage facilities.—Erection of additional tankage is under way at Kansas City, Minneapolis, and Omaha and is completed at Des Moines. Construction of new tanks is scheduled to commence soon at Mason City, Mankato, Sioux City, Sioux Falls, Alexandria, and Fargo. Pumping station enlargement is under way at several locations.

New Line Proposed

WASHINGTON.—South Central Alabama Natural Gas Co., Inc., Birmingham, is seeking Federal Power Commission authorization to construct approximately 150 miles of pipe line to carry natural gas to about 92,000 people in south Central Alabama. Estimated total cost of the project is $2,500,000.

The company also asked FPC authorization to connect its proposed system with, and to obtain a supply of natural gas from, Southern Natural Gas Co.'s line in Elmore County, Alabama.

South Central said the proposed system, which would have a design capacity of 15,000,000 cu. ft. per day, would carry gas to the following Ala-



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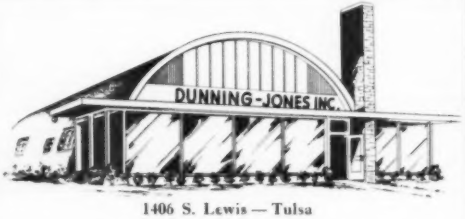

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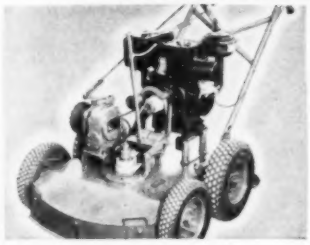

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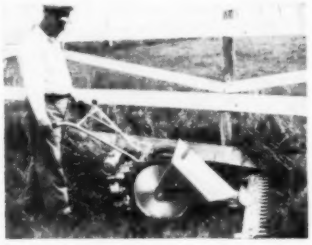

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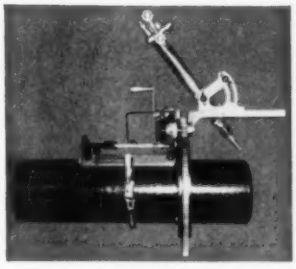

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SPEED: Complete cut and bevel can be made on 12 inch pipe in about 2 minutes.
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bama municipalities and surrounding areas: Union Springs, Brundidge, Troy, Elba, Enterprise, Ozark, Headland, Geneva, Florala, Opp, Brantley, Luverne, Greenville, Dothan, Andalusia, and Gantt. The application says that at present there is no gas available in this area other than liquefied petroleum gas.

Acquires New Systems

CORPUS CHRISTI.—Southern Pipe Line Co. of Corpus Christi has acquired two South Texas crude-oil gathering systems which move 2,737 bbl. of oil daily, and has completed construction of one to serve the new Louella field of Jim Wells County.

The two systems were formerly operated by Humble Oil & Refining Co. in Plymouth field, San Patricio County, and Magnolia Petroleum Co., in the Hobson and Hysaw fields, Karnes County.

Stanolind Boosts Tariff

TULSA.—Stanolind Pipe Line Co. has joined with associated carriers in raising the pipe-line rate from Wyoming points to eastern terminals 5 cents per barrel on crude.

Stanolind's new rate was raised from 45 cents to 50 cents on crude transported from Wyoming fields to the Standard Oil Co. (Ind.) refinery at Whiting, Ind., and from 42 cents to 47 cents per barrel on crude from Wyoming to Wood River, Ill.

The company has been moving approximately 55,000 bbl. daily through its line from Casper, Wyo., into the Wood River-Whiting refining area.

Corrosion Data

Information on resistance being analyzed by bureau

Valuable information on resistance to underground corrosion of a wide variety of ferrous and nonferrous metals and alloys has resulted from field experiments now being analyzed by the National Bureau of Standards. I. A. Denison and M. Romanoff have been conducting the experiments.

Approximately 3,000 specimens of representative pipe materials, exposed to soil corrosion for periods up to 14 years, have been examined, and the loss of weight and depth of pitting have been measured and interpreted. Because of the broad range of environmental conditions commonly encountered in underground construction, the specimens were buried at 15 test sites widely separated throughout the United States.

In order to evaluate the practical importance of soil corrosion, the Bureau of Standards began a long-term field investigation of this problem in 1922. At that time little was known

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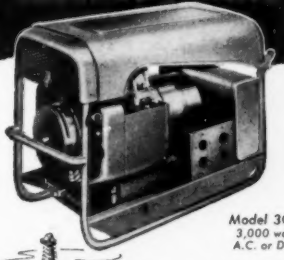
ONAN *Oilfield* **Electric Plants**



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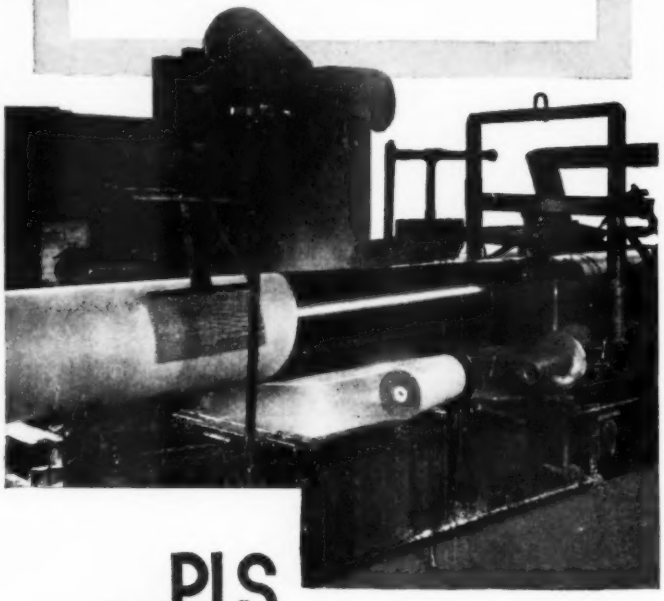
Nothing is left to chance at Pipe Line Service to give customers uniform, high quality pipe protection. All equipment used has been developed by PLS engineers for maximum efficiency and economy in cleaning, priming, coating and wrapping.

Typical of the precision techniques employed is the coating and wrapping operation illustrated here. The pipe is propelled by positive-drive units which control the forward spiral movement of the pipe through the coating machine. This insures *uniform* lap of wrappers at all times.

Precision equipment like this is operated by trained personnel *inside* our plants to avoid delays caused by weather conditions. These factors add up to PLS *controlled* service which gives you more for your money in pipe protection.



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concerning the useful life to be expected of underground structures for the transmission, distribution, and storage of water, gas, and liquid fuels. In the absence of information on the corrosiveness of soils, the occasional failure of metals underground was attributed to the discharge of stray electric currents in the earth or to factors, such as high acidity, which everyday experience had shown to be corrosive to iron and steel. Where these conditions were not present, it was generally assumed that an iron or steel pipe or tank of standard wall thickness might be expected to last indefinitely.

The results of this early field study, however, indicated that corrosion of ordinary types of iron and steel in soils is much more general than had been supposed, and interpretation of these results in terms of modern corrosion theory, supplemented by laboratory studies at the Bureau, showed that corrosion is a natural consequence of the normal physical, chemical, and biochemical action of soils on metal surfaces. These conclusions were later confirmed by extensive examination of the underground pipe lines and correlation of the observed corrosion with the properties of the surrounding soil.

The change in the rate of corrosion of metals with time is of considerable practical importance. In soils in which the corrosion rate of metal rapidly diminishes, with time an efficient means of combating corrosion is to provide adequate thickness. If, for example, a section of pipe is exposed to conditions which soon induce a virtual cessation of corrosion rate, the life of the pipe might well be made infinite simply by doubling the wall thickness.

Coating Contract Let

BARTLESVILLE, Okla.—The Somastic Division of H. C. Price Co. here has received a contract from Fish Constructors, Inc., for coating of more than 40 miles of pipe to be used on Transcontinental Gas Pipe Line Co.'s Texas-to-New York City natural-gas line.

Work will be done at the division's Philadelphia plant. Contract includes coating of more than 100,000 ft. of 30-in. pipe. Special equipment was prepared here and shipped to Philadelphia in order to facilitate handling the large-diameter pipe.

Balance of the 240,000 ft. to be coated is as follows: 8,800 ft. of 20-in.; 8,300 ft. of 14-in.; 17,500 ft. of 12-in.; 9,700 ft. of 10-in.; 66,600 ft. of 8-in.; 15,800 ft. of 6-in.; and 1,100 ft. of 4-in.

Majority of the coated pipe will be laid in the industrial area of eastern Pennsylvania and in New Jersey where heavy electrolytic action makes it necessary to have maximum corrosion protection, the Price company said.

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PIPE TONGS

. . . and for speedy delivery of Bucyrus-Erie and Koehring earth-moving equipment, Gorman-Rupp pumps, Schramm air compressors, International engines. All accessories.

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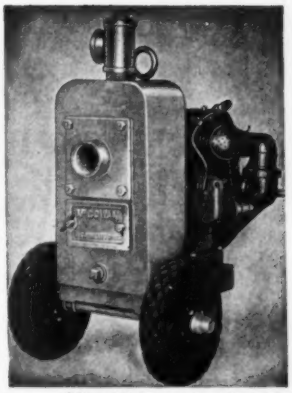

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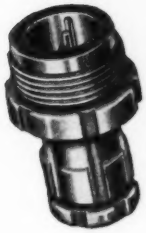

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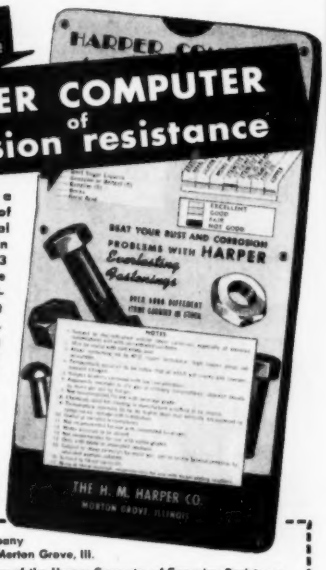

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Number of Active Rigs Highest Since January

Operating rotary rigs in the United States and western Canada during the week ended April 3 (latest report) totaled 2,078, an increase of 43 over the number running during the preceding week. The number was the highest since the first week of January, and only 15 short of the number reported running a year ago. The West Texas-New Mexico area accounted for most of the increase with a gain of 32 in the number of rigs running during the week. A substantial increase in drilling activity also was indicated in the Illinois basin district. Western Canada, which had a sharp drop in number of active during the previous week, recovered some of its loss.

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area—	Week ended 4-3-50	Change week ended 3-27-50	Change week ended 4-4-49
Gulf Coast	497	—10	— 71
W. Tex.-N. M.	732	+32	+173
Ark.-N. La.-E. Tex.	119	+ 3	— 25
Oklahoma	248	— 1	— 26
Kansas	121	+ 1	+ 6
Illinois-Eastern	94	+11	+ 23
Rocky Mountains	65	— 2	— 31
Pacific Coast	132	— 3	— 54
Total U. S.	2,008	+31	— 5
Western Canada	70	+12	— 10
Total	2,078	+43	— 15

*Courtesy Hughes Tool Co.

Hubbell & Webb, Stroud, Okla., have moved in a rotary rig for a wildcat test which they will drill for Creekmore-Rooney Co. of Tulsa in 32-14n-6e, eastern Lincoln County, Oklahoma. Contract is for 4,500 ft.

Wynn Hawkins has been awarded the contract for a projected 8,300-ft. test, 1 Crosby-Young, which American Republics Corp. will drill about 2 miles southeast of the Possum Corner field in Wilkinson County, Mississippi. Location is in 15-4n-2w.

Carl Todd, Wichita, has moved a rig to a wildcat location 2½ miles northeast of the Ames pool, Barton County, Kansas, where he will drill for Henderson Oil Co. at 1 Jordon, 8-18s-11w.

Adkins Drilling Co., Great Bend, Kan., has a rig running for Nate Appleman and associates on a rank wildcat location in the extreme northeast corner of Wabaunsee County, northeastern Kansas. The location, in 26-10-11e, is about 25 miles northeast of the Davis Ranch pool, opened last year, where this contractor drilled the discovery well for Carter Oil Co., and since has completed its sixteenth well.

Thomas P. Pike Drilling Co., Los Angeles, has contracted with Standard Oil Co. of California to operate two rigs in the Standard Oil-Navy program for the development of the

Daylight and evening-tour crews and visitors line up in front of the rig on a wildcat test which Whiteley-Phillips Drilling Co., Dallas, is drilling for A. O. Phillips in the Copeland Creek area of Polk County, southeastern Texas. Bottom row, left to right: I. W. Beasley, driller; J. M. Grimes, derrickman; D. R. Chancelor, motorman; R. C. Grimes and C. H. Beasley, floormen; E. E. Samford, Longhorn Supply Co., Houston; L. B. Maxwell, drilling and production superintendent. Top row, same order: W. O. Williams, driller; J. T. Thompson, derrickman; J. E. Williams, motorman; J. B. Johnson and William E. Adams, floormen; A. D. Lee, Lee Construction Co., Houston; J. L. Callaway, Bethlehem Supply Co., Houston.

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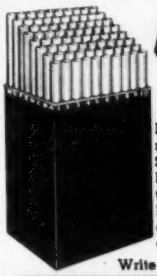

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Stevens oil zone in the Elk Hills field. The contract will extend over a period of several years.

Coats & Hearrell Drilling Co., Longview, Tex., has contracted for a 6,000-ft. test to be drilled for Morris Coats and John Robbins in the J. M. Brown survey, southeast of Bettie, Upshur County, East Texas.

Berridge & Sandell, Cut Bank, Mont., have contracted for a well to be drilled southeast of the Pondera field, Pondera County, Montana, for Lexia Oil Co. Location for the well, 1 Trevillion, is in 21-27n-4w. Operations are expected to get under way by April 15.

Sun Drilling Co. will be the contractor on a well which California Co. is starting in the pool which this contractor recently discovered west of Grady, Jefferson County, southern Oklahoma. The California Co. well, 1 Johnson, NW SW SW 23-6s-5w, offsets Sun's discovery well.

K. B. Knox Drilling Co., Houston, is starting a wildcat test of its own at 1 Marcelin Francois, in 8-10s-7e, St. Martin Parish, coastal Louisiana. Hole is projected to 3,200 ft.

A. W. Eggleston, Houston, has a rig running for American Republics Corp. at 23 Columbia Land & Timber Co., latest well to be started in the Bancroft field, Beauregard Parish, coastal Louisiana.

Canadian Drilling Co., Edmonton, Alta., has moved a rig to a location about 3 miles west of production of Leduc field, southwest of Edmonton, where it will drill for Borealis Oils, Ltd. Location is in LSD 8, 21-50n-27w4th.

Murfin Drilling Co., Wichita, is the contractor and a joint operator with Helmerich & Payne, Inc., Tulsa, in drilling a wildcat test located 6½ miles north of Chase pool, in Rice County, Kansas. The test, 1 Harp, is in 24-21-16.

Tracey Harkness Drilling Co., Bakersfield, has the contract for Western Gulf Oil Co.'s new wildcat test in the Oak Canyon area, Los Angeles County, California. The test is 2 Lechler, 31-5n-17w.

R. L. Turner Drilling Co., Luling, Tex., is drilling a wildcat test 9 miles east of Sequin, Guadalupe County, Southwest Texas. The test, projected to 2,400 ft., and located in the Green DeWitt League 11, is being drilled for this company's own account.

Kirkwood & Co., Alice, Tex., is starting a wildcat test for Southern Minerals Corp. in the Josiah H. Bell Survey, 7 miles southeast of Vanderbilt, Jackson County, South Texas. The test, 1 Lucille Seale Estate, is projected to 7,400 ft.

Anschutz Drilling Co., Wichita, is drilling for Campbell Drilling Co., Great Bend, Kans., at 1 Hagerman, a wildcat test located in 21-19-16, 1½ miles northwest of Ryan pool, Rush County, Kansas. Anschutz also is providing support for the test.

Regent Drilling Co., Edmonton, Alta., has been awarded the contract for an outpost test which K.M.S. Syndicate in the Redwater field area, northeast of Edmonton. The location, in LSD 10, 34-57n-22w4th, is about 1½ miles southwest of production of the field.

Advance Drilling Co., New Harmony, Ind., and Charles Clark, Evansville, have been awarded the contracts for two additional wells which Indiana Farm Bureau is starting in its Refinery pool area at the northwest edge of Mount Vernon, Ind.

Harbor Drilling Co., Wichita, is moving a rig to a rank wildcat location in northern Lincoln County, on the west side of Salina basin, in North Central Kansas, where it has obtained a farmout from Carter Oil Co. and will drill for its own account. The test will be 1 Rasmussen. The location is in 29-10-9.

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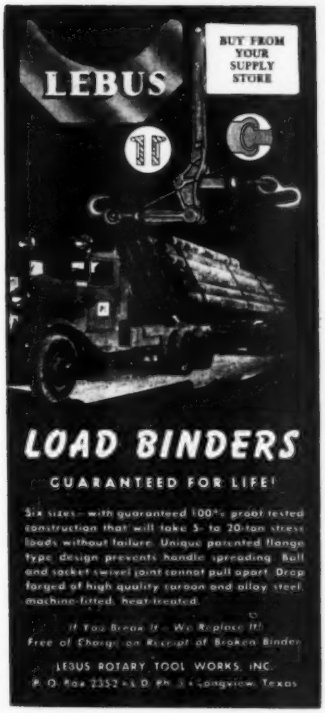

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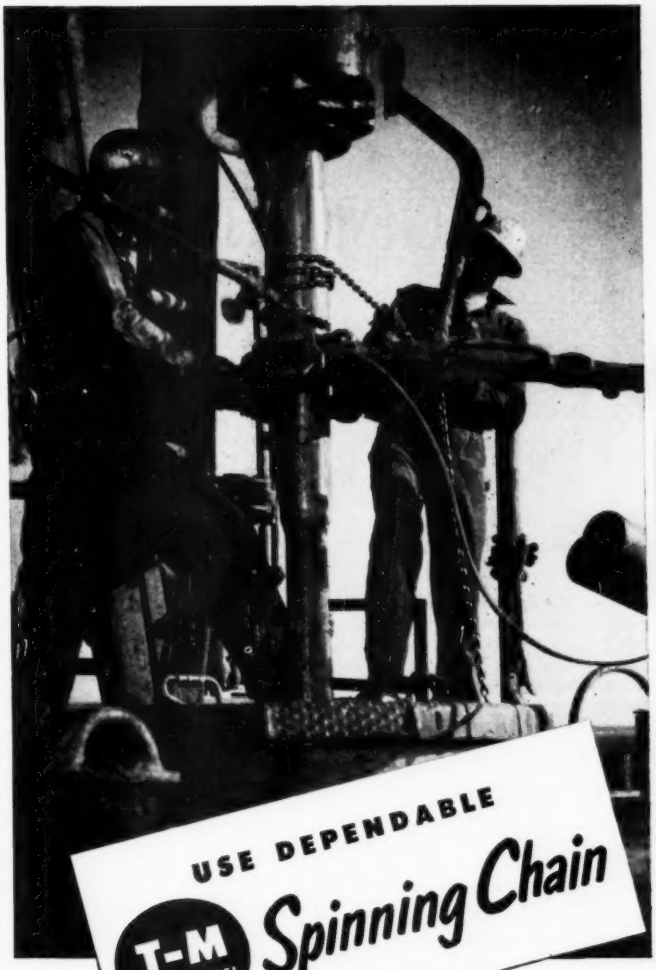

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by

FLUOR RESEARCH *and* ENGINEERING PERSONNEL

Indicate the Subject by Number

1 **"Fractionating Absorbers in the Petroleum Industry"**

By: J. C. HANNAH, *Process Engineer*

Abstract: *Rapidly changing conditions necessitate familiarity with all methods now in use in the petroleum industry for separating mixtures of low-boiling hydrocarbons and associated compounds in order to obtain the most economic method for a given gas recovery and/or purification problem. This paper discusses one of these methods, i.e., fractionating absorbers. An example of application to actual plant data is shown.*

2 **"Pulsation Phenomena in Gas Compression Systems"**

By: I. C. BECHTOLD, *Director of Research and Development*

Abstract: *Pulsation phenomena in gas transmission lines leading to and from gas compressor stations are described along with a description of the mechanical vibration induced from the pulsative flow.*

3 **"Effect of Pulsation on Gas Measurement"**

By: C. F. YATES, *Research Engineer*

Abstract: *This paper discusses the effect of pulsative flow on the accuracy of measuring gas-flow rate by orifice meters. Data are presented showing the relationship between magnitude and nature of the pulse and the resultant readings recorded by the measuring instrument.*

4 **"Simultaneous Determination of Hydrogen Sulfide and Carbon Dioxide in a Continuous Gas Stream"**

By: C. L. BLOHM, *Assistant Director of Research, and* F. C. RIESENFELD, *Research Chemist*

Abstract: *A method is described for the simultaneous determination of hydrogen sulfide and carbon dioxide in a continuous stream of natural gas. The two acidic gases are absorbed in standardized iodine and barium hydroxide solutions. Only simple laboratory equipment is required.*

5 **"Mechanical Vibration of Piping Induced by Gas-Pressure Pulsations"**

By: R. C. BAIRD, *Research Engineer, and* I. C. BECHTOLD, *Director of Research and Development*

Abstract: *The generation and nature of gas-pressure pulses from reciprocating compressor action are described, together with the propagation of such pulses through pipe lines. The means whereby pulse energy is converted to mechanical vibration is discussed by the aid of analogous mechanical, acoustical, and electrical oscillatory systems. The economic importance of minimizing vibration in compressor and compressor-dependent installations is indicated.*

6 **"A Critical Analysis of Methods of Determination of Water Dew Point in Hydrocarbon Gases"**

By: F. C. RIESENFELD, *Research Chemist, and* H. D. FRAZIER, *Research Chemical Engineer*

Abstract: *The authors have found that the values obtained from conventional dew point determination apparatus do not give true results when used on gases effluent from liquid dehydrators. A theoretical explanation for this phenomenon and a description of a method for determining the absolute water content of gases from this type of dehydrator is offered.*

7 **"Purification and Dehydration of Gases"**

By: C. L. BLOHM, *Assistant Director of Research, and* W. F. CHAPIN, *Process Engineer*

Abstract: *This paper covers the chemistry and chemical engineering of regenerative processes for removing hydrogen sulfide and carbon dioxide from gases by use of amine processes together with their simultaneous or subsequent dehydration. In addition there is presented a description of the engineering features and operation of the Glycol-Amine plants which treat gas transported through the Texas-California line.*

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REFINING

Dupo Refinery Operating

DUPO, Ill.—Dupo Oil Refining Co., Inc., has taken over the old H. H. Cross refinery here which had been idle for some time, and has enlarged the facilities for producing gasoline, distillate, fuel oil, and coal-treating oil.

L. H. Jonas, secretary of the company, reported that the plant has been completely rehabilitated and enlarged, and is in regular operation. Daily capacity is 1,000 bbl. The plant was taken over mainly to process crude produced in the Dupo field, Jonas said, most of which is owned by the five stockholders of Dupo Oil Refining Co.

The firm plans to bring in and process additional oil when conditions warrant, Jonas said.

Deep Rock's Runs Off

Due to shutdown of uneconomical units with high operating costs, Deep Rock Oil Corp.'s Cushing, Okla., refinery processed less crude during 1949 than the year previous, the company's annual report disclosed.

Crude oil processed at the plant totaled 4,186,000 bbl. for 1949, or a daily average of 11,500 bbl. The daily average was 12,400 bbl. in 1948.

The firm's new catalytic cracking unit, which will produce higher yields from crude, is nearing completion and will be put on stream this spring.

Oil-Measurement Tables

Excellent progress is reported by American Society for Testing Materials on the oil-measurement tables which are being prepared in cooperation with the Institute of Petroleum (London). These tables will represent an important milestone in that they will establish a basis for the buying and selling of petroleum products throughout the world, A.S.T.M. said. The calculation work on the tables, which when published will comprise 1,100 pages, has been completed.

Extent of the statistical end of the project can be appreciated in that the data as calculated fills 6,500 pages and required 450,000 calculating machine cards. The cards alone weigh about 3,000 lb. There is still a major editorial job to be completed in checking the tables and preparing them for publication.

Another important accomplishment is completion of material for a new A.S.T.M. manual on gaging and sampling of petroleum and petroleum products. This manual will include detailed procedures for gaging, temperature measurement, sampling, and information on methods of calculation. The committee has been at work on this manual for the past 2 years and it will contain the latest practices on this subject for use throughout the many branches of the petroleum industry.

Decreased Refinery Runs

Crude runs to refineries of Panhandle Producing & Refining Co. at Wichita Falls and Lueders, Tex., fell off 367,291 bbl. during 1949 as compared with the 1948 figure, the company stated in its annual report to stockholders. Total runs were 1,338,104 bbl. compared with 1,705,395 bbl. in 1948.

The decrease was due to the unusual number of shutdowns for repairs at Wichita Falls, and suspension of operations to make adjustments and arrange for connections for operation of a new catalytic cracking unit, the report disclosed.

Up to September 30, 1949, average crude runs at both refineries amounted to 4,100 bbl. daily. With the new cracking unit in operation at Wichita Falls, average daily runs are expected to be 5,500 bbl. daily this year. The company shut down operations at its Lueders plant, and it is now on a standby basis, the report stated.

Panhandle Eastern operated both refineries at a loss during the year. The Wichita Falls plant showed a loss of $121,574, or 11 cents per barrel of crude runs, and the Lueders plant showed a loss of $86,544, or 34 cents per barrel.

Taxes From Oil Rise

WASHINGTON.—Treasury collections from the three oil taxes during the first 7 months of the current fiscal year showed a net increase of only $10,000,000 over the corresponding period a year ago, all of it due to gasoline, it was disclosed last week by the Internal Revenue Bureau.

A bureau report showed that while gasoline-tax receipts from July 1 to February 28, last, were up $14,475,108, revenue from lubricating oil was $3,294,276 less and from pipe-line transportation $142,329 less than a year ago.

During the 7 months the Treasury secured $352,102,750 from gasoline against $337,627,642 last year; $49,087,862 from lubricating oil against $52,382,138, and $12,562,066 from pipeline transportation against $12,704,395.

In February, the bureau reported, $5,709,664 was received from lubri-

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4 handles, 3 extensions
15 Hex. Sockets in tray.
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HEAVY DUTY SET, 3/4" Sq. Drive
7 Handles and extensions
12 Double broach Hex. Sockets
1-5/16" to 2-1/8"

11 BOXOCKET WRENCHES
(double offset)
Sizes 7/16" to 1-5/8"

5 OPEN END WRENCHES
(double end)
Sizes 25/32" to 1-1/2"

8 COMBINATION WRENCHES
(short handle)
Sizes 5/16" to 3/4"

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cating oils against $4,422,629 in the same month last year; $37,654,712 from gasoline against $37,170,423, and $1,872,019 from pipe-line transportation against $1,637,820.

Sinclair Plants Sold

TULSA.—Sinclair Refining Co.'s refineries at Sand Springs, Okla., and Coffeyville, Kans., have been sold to the New York firm of Lipsett, Inc. They will be resold and the remainder scrapped. Both plants have been shut down for several months.

John Raye, project manager for Lipsett, said his company has already started dismantling the Coffeyville plant.

Closing of Sinclair's Sand Springs and Coffeyville refineries was part of a major program in which the firm shut down several plants after construction of a products line from its Houston refinery north to East Chicago, Ind. These included plants at Fort Worth and Kansas City.

Gasoline-Treating Units

Catalytic Construction Co., Philadelphia, has been awarded a contract to construct three gasoline-treating units for California Refining Co. at the Barber, N. J., plant.

Construction will begin immediately on two lead sulfide sweetening plants and a reagent plant. Completion is scheduled for August.

New Research Subsidiary

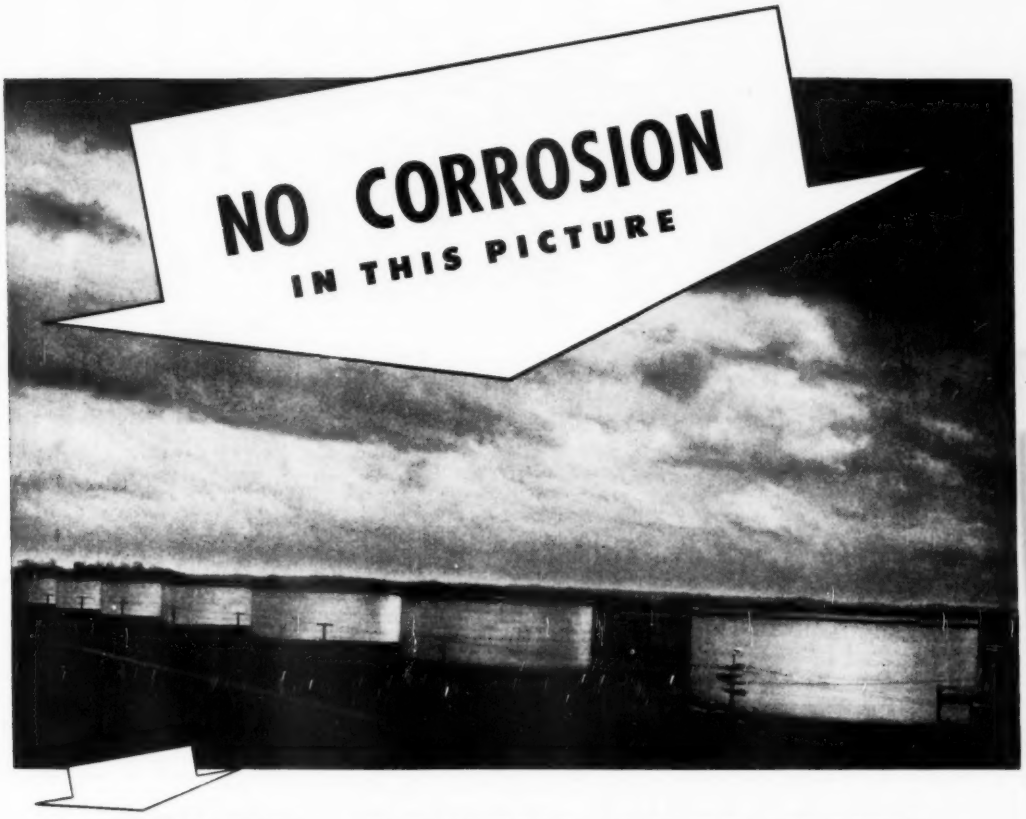
SAN FRANCISCO.—A new wholly owned research subsidiary of Standard Oil Co. of California, the California Research & Development Co., will be formed to undertake a new research project for the U. S. Atomic Energy Commission.

The project will involve construction of a particle accelerator and will be located at the formal naval air station near Liveremore, in Alameda County, California. Fred Powell, formerly general manager of Socal's El Segundo, Calif., refinery, will head the new subsidiary.

Safety Leader

The manufacturing department of Socony-Vacuum Oil Co., Ltd., led the manufacturing departments of every other large oil company in the United States in safety during 1949, National Safety Council figures show. Socony's Paulsboro, N. J., refinery ranked safest among the world's 13 largest refineries.

Throughout the firm's manufacturing department, which includes 15 refineries, employes recorded only 1.85 disabling injuries for each 1,000,000 hours worked in 1949.



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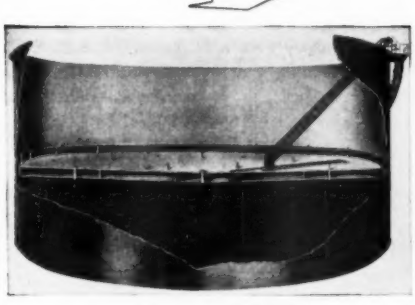

Cut-away view showing details of Graver Double Deck construction.

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Exploration and Drilling

Second Pool for Forest City Basin, Kansas?

JUST about 11 months after the first oil discovery on the southern part of Forest City basin of Kansas, and after many intervening wildcat failures, a second strike looks promising. Stanolind Oil & Gas Co.-Winkler Koch Engineering Co. 1 Cornwell, NE NE NE 26-16s-10e, in northern Lyon County, Kansas, looks highly promising for a discovery in the Hunton lime.

On a drill-stem test of the interval 2,952-67 ft., in Hunton lime topped at 2,950 ft., operator recovered 1,000 ft. of clean oil, 30° to 34° gravity, in 30 minutes, bottom-hole flowing pressure reported 913 psi. A string of 5½-in. pipe is being run before further testing. A previous drill-stem test in the Mississippian at 2,480-2,511 ft., recovered only 30 ft. of mud.

This well must be close to the south regional limits of Hunton, where it pinches out against the Ozark plateau, and it will be surprising if it has a very thick section of Hunton. The Ohio Oil Co. 1 Kisler, a dry hole in Section 21, about 2½ miles northwest of the Cornwell, had only 29 ft. of Hunton. Although the Cornwell test is checking 51 ft. higher on top of the Hunton than the Kisler, most of this is probably higher structural position; at least the operators probably hope most of it is.

Although the well was drilled on the basis of surface structure, some geologists are at least speculating that it just might possibly be another stratigraphic trap like West Edmond field in Oklahoma. They point out that so close to the pinchout, the Hunton in this vicinity could easily have been subjected to subaerial erosion and development of local porosity. At this stage of development, a sizable strat-trap oil field is an extremely long shot, but not an impossibility.

The new strike, like Davis Ranch (Viola production) pool, about 17 miles north, lies in the Forest City basin, east of the Nemaha granite ridge. The deepest part of the basin lies close to the ridge, and both the Stanolind well and Ravis Ranch pool lie nearly along strike, east of the deepest part, and on the upward slope. A considerable portion of this basin is covered with glacial drift, and surface-mapping possibilities range from difficult to impossible. If the Stanolind test opens a pool, it, like the Davis Ranch, will be credited to surface geology. But then a lot of dry holes in the basin can also be charged against surface geology.

Stanolind and Winkler-Koch, jointly and separately, have about 3,000 acres in a block around the present test. From an elevation of 1,437 ft., tops were reported as follows: Lansing 1,437 ft., Kansas City 1,623 to 1,850 ft., Mississippian 2,471 ft., Kinderhook 2,818 ft., and Hunton 2,950 ft. The likelihood of the Hunton section being thin probably accounts for the decision of the operators to set pipe after penetrating only 17 ft.

The Viola, which is yielding a nice little oil field on the Davis Ranch 17 miles north, remains to be tested. Below the Viola there are still possibilities, assuming a normal section, of finding something in the Simpson, and in the Arbuckle. On the Davis Ranch, the Viola produced with a cover of about 150 ft. of Hunton. In the Stanolind well, or in an offset, it would seem reasonable to find the Viola 100 ft. or more higher, provided there is no thickening in the Maquoketa section in between the Hunton and Viola. The interval between top of Hunton and top of Viola in the discovery well on the Davis Ranch is 226 ft.

Charles J. Deegan.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

PERMIAN BASIN.—Thirteen miles north of Pegasus field, Magnolia Petroleum Co. 2 Roy Parks was assured of a Pennsylvanian discovery after flowing 44-gravity oil on a drill-stem test, and on the basis of subsequent electrical surveys. According to unofficial word, importance of the strike lies in its similarity, so far, to Magnolia's Pegasus discovery, which had prospects of commercial production from the Pennsylvanian through the Ellenburger, but which completed in the latter formation. Original objective of the Parks test was the Ellenburger, but tentative plans may stop its drilling when the Pennsylvanian has been explored, and the area developed from that formation. Reinecke pool in southeast Borden County, producing from the main Canyon reef, was extended 1 mile west and slightly north. Castleman & O'Neill 1-A Griffin, NE NE Sec. 51, Block 25, H&TC Survey, ran 90 ft. low to George P. Livermore's discovery well, but flowed to pits at estimated rate of 60 bbl. per hour to clean oil. Barnsdall Oil Co. 1 Wilson, NE NE Sec. 16, Block 27, H&TC Survey, new roof pool opener east of Vealmoor field, along south line of Borden County, completed for 1,604 bbl. Potential of 47°-gravity oil through ½-in. tubing choke. In Lea County, New Mexico, Fowler Ellenburger pool, about 7 miles north of Jal, got its second producer, even though the well ran several hundred feet low on the Ellenburger compared to the discovery. The extension is Stanolind Oil & Gas et al., 2 South Mattix Unit, SE SW 15-24s-37e.

SOUTH LOUISIANA.—Commercial oil production boundaries have been pushed to 25 miles off the St. Mary Parish coastline. Magnolia Petroleum Co. A-2 State Lease 693, Block 125, flowed at the rate of 372 bbl. of 32.3°-gravity oil daily through a ⅛-in. choke on a 2-hour drill-stem test. Test was made through perforations at 11,656-58 ft. This discovery marks Magnolia's first oil production in the Gulf of Mexico, although the company has opened six gas fields. The new well was drilled in approximately 35 ft. of water.

ROCKY MOUNTAIN AREA.—British-American Oil Producing Co. tested some oil in the Dakota sand at 5,406-16 ft. at its Armstrong area wildcat, Logan County, Colorado, and is now testing shows in the Lakota. Ohio Oil Co. found oil in first Dakota sand at its Sunol wildcat northeast of Sidney, Neb., and is drilling for a test in the third Dakota.

SOUTHWEST TEXAS

Karnes County Runge Area Gets New Pool

CORPUS CHRISTI.—Three miles southwest of Runge in Karnes County, Cox & Hamon 1 A. & L. Schoore, on potential test flowed 139 bbl. of 37.2°-gravity oil per day through a ½-in. choke. The casing was perforated with four shots at 6,545-46 ft. The well was drilled to a depth of 6,762 ft. and 5½-in. casing set on bottom. The new field opener is located in the Victor Blanco Survey, Abstract 3, approximately ½ mile west of the Runge field.

Cox & Hamon A-2 Driscoll opened another field in Duval County in Block 54, Santa Rosalia Grant. The pay was topped at 3,355 ft. and casing perforated 3,356-59 ft. with 12 shots. Through a 3/16-in. choke the well flowed 96 bbl. of 30.6°-gravity oil per day with tubing pressure of 125 psi. and casing pressure of 585 psi.

Humble Oil & Refining Co. is completing the 2 King Ranch-Canelo for an oil discovery in the CCSD&RGNG RR Survey 310, 8 miles west of Riviera, in the Salto area of Kleberg County. On initial test, the well flowed 115 bbl. of 40°-gravity oil daily with 620 psi. pressure on the tubing. The new discovery was drilled to a depth of 8,823 ft. and plugged back to 6,637 ft. for completion. Production is through perforations at 6,621-37 ft.

Just south of the West Alfred field, Jim Wells County, The Texas Co. has run a drill-stem test on the 1 Ed C. Adams and made gas, wash water and oil by swabbing. The wildcat is at a depth of 4,105 ft. and the test was made through perforations at 3,876-86 ft. Casing pressure on the test was 75 psi. This test is located in the Juan Hernandez Survey 10, Abstract 204.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Bexar County: New oil pool—C. J. Brown 1 W. A. Petty, Lot 1, Block 55, San Antonio Irrigated Farms Subd., 5 mi. SW of Lytle, J. H. Pickens Sur. 7, A-17, TD 1,482 ft., PBTD 1,235 ft., open hole 1,174-235 ft., IP: 13 bbl. oil per day on pump, 32° gravity.

Duval County: New oil discovery "South Seventy Six"—The Texas Co. 1 Duval Co. Ranch NCT-54, Gonzalo Garza Sur. 76, 5 mi. NW of Freer, ½ mi. S of Seventy Six field, top pay 1,710 ft., TD 2,548 ft., PBTD 1,745 ft., perf. 1,710-20 ft., Chernosky sand, IP: 49 bbl. oil per day on pump, 25.5° gravity.

Hidalgo County: New oil pay at Donna—Sinclair Oil & Gas Co. 1 Foran Unit, Sec. 15, Alamo Land & Sugar Co. Subd., top pay 6,018 ft., TD 8,560 ft., perf. 6,018-28 ft., IP: 187 bbl. oil per day, ¼-in. choke, TP 174 psi., CP 279 psi., 50.1° gravity.

New oil pay at Donna—Sinclair Oil & Gas Co. 1 L. W. Shaffer, Lot 9, Block 16, Alamo Land & Sugar Co. Subd., Porcion 72, top pay 6,900 ft., TD 6,595 ft., perf. 6,898-908 ft., IP: 185 bbl. oil per day, 3/16-in. choke, TP 475 psi., CP 1,075 psi., 45.6° gravity.

Kleberg County: New pay at Canelo, Humble Oil & Refining Co. 2 King Ranch-Canelo, CCSD&RGNG RR Sur. 310, 8 mi. W of Riviera, top pay 6,630 ft., TD 8,823 ft., perf. 6,621-37 ft., IP: 112 bbl. oil per day, ⅛-in. choke, GOR 762, TP 700 psi., 40.4° gravity.

Nueces County: New pay at Mustang Island—The Atlantic Refining Co. 1 State Tract 409, Corpus Christi Bay, top pay 7,310 ft., TD 8,000 ft., perf. 7,311-21 ft., IP: 240 bbl. oil per day 10/64-in. choke, GOR 744, TP 1,175 psi., 39.9° gravity.

Zapata County: gas discovery—J. C. McCabe 1 Cuellar Bros., TCRR Sur. 245, 1 mi. W of Cuellar field, TD 1,309 ft., perf. 1,146-50 ft., IP: 2,000,000 cu. ft. gas, open flow SIP 225 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: George W. Graham 1 A. E. Kinsel, Green B. Tankersley Sur. 468, A-827, 3 mi. SE of McCoy, dry, TD 6,003 ft.

Kirkwood & Co. 1 Tom Campbell et al, William M. Smith Sur. 200, A-803, 10 mi. E of Campbellton, dry, TD 5,930 ft.

Bandera County: Chemical Attraction Oil Co. 1 C. J. Zwanzig, Antonio Curvier Sur. 71, ½ mi. NE of Medina, dry, TD 985 ft.

Duval County: Daubert & Achning 1 J. M. Bennett, Sur. 150, 3 mi. S-SW of Poquito Creek field, dry, TD 3,750 ft.

Hidalgo County: Continental Oil Co. 1 R. N. Smith et al, Lot 60, New Caledonia Unit 1 Subd., 3½ mi. NW of Mission, dry, TD 7,548 ft.

Jim Hogg County: M. L. Massingill et al 1 Howell McCampbell, Las Vivoritas Grant, A-226, 11 mi. S of Hebbronville, dry, TD 5,015 ft.

Webb County: O. W. Killam 1 Marshall Bros., Block 29, Sur. 674, 9 mi. N of Bruni, dry, TD 2,416 ft.

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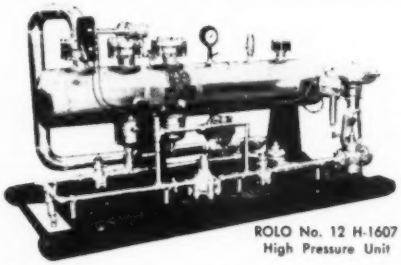

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APPALACHIAN FIELD

United Fuel Completes Large Gas Discovery

PITTSBURGH.—In Tucker district, Wirt County, West Virginia, United Fuel Gas Co.'s wildcat, 6549 S. O. Toncray, elevation 836 ft., was completed with final test 22,699,000 cu. ft. of gas, natural. Rock pressure was 1,445 psi. Tops recorded were: Corniferous lime 5,021 ft., Oriskany sand 5,148 ft., gas 5,150-59 ft., total depth 5,159 ft. In Elk district, Kanawha County, the same company's 13-6547 J. H. Copenhaver gaged 9,811,000 cu. ft. of gas, natural, with rock pressure 1,550 psi. Corniferous lime was logged at 4,953 ft., Oriskany sand 5,074 ft., gas 5,083-94 ft., total depth 5,094 ft.

Eleven new wells were staked in West Virginia: one each in Barboursville district, Cabell County; Sherman district, Calhoun County; Grant district, Jackson County; Union district, Kanawha County; Chapmanville district, Logan County; Franklin district, Marshall County; Big Creek district, McDowell County; Grant district, Pleasants County; Curry district, Putnam County; Geary district, Roane County; Williams district, Wood County.

In Amwell Township, Washington County, Pennsylvania, Manufacturers Light & Heat Co. 2 John A. Hufford resulted in 1,256,000 cu. ft. of gas, total depth 3,040 ft. In Napier Township, Bedford County, South Penn et al, Snee & Eberly 1 Jesse Miller, elevation 1,666 ft., reported the tools stuck at a depth of 7,255 ft. In Wharton Township, Fayette County, William E. Snee et al 3 Indian Creek Coal & Coke Co., elevation 2,615 ft., is still cleaning out after shot; gas now tests 20,000 cu. ft. In Georges Township, Orville Eberly et al 1 N. E. Murphy, elevation 2,560 ft., is cleaning out at 7,420 ft. In Derry Township, Westmoreland County, Peoples Natural Gas Co. 4-3814 Camilla Giffen, elevation 2,238 ft., is shut down at 9,200 ft.

Three new locations in southwest Pennsylvania were reported: Red Bank Township, Clarion County; Amwell Township, Washington County; Allegheny Township, Westmoreland County.

WEST VIRGINIA SUCCESSFUL WILDCAT

Wirt County, Tucker district: United Fuel Gas Co. 6549 Toncray, elev. 836 ft., 22,699,000 cu. ft. of gas, natural, from Oriskany at 5,150-59 ft., TD.

KANSAS

Another Pool Indicated For Forest City Basin

THE Forest City basin in the northeastern part of the state appears to have another oil discovery. Stanolind Oil & Gas Co. and Winkler-Koch Engineering Co. 1 Cornwell, NE NE NE 26-16-10e, northwestern Lyon County, found good saturation in Hunton lime, topped at 2,950 ft. (—1,603 ft.). A 30-minute drill-stem test was made of an interval at 2,952-67 ft., resulting in a recovery of 1,000 ft. of clean oil having a gravity of approximately 34°. Indicated bottom-hole pressure was 913 psi. A string of 5½-in. casing is being run with a view toward completing the well in this zone.

The location, just south of the Bushong townsite, is about 17 miles south of the Davis Ranch pool, in Wabaunsee County. It was the discovery of the latter pool about a year ago by Carter Oil Co. that revived interest in the potentialities of the Forest City basin and precipitated an extensive exploratory and wildcatting play in that part of the state. The Stanolind well is the first exploratory test in the basin since the discovery of the Davis Ranch pool to show particular promise of production.

Production of the Davis Ranch pool, in which 18 wells have been completed, most of them with maximum potentials, is from the Viola lime, about 225 ft. below the Hunton lime. Top of the Hunton in the Stanolind well is at about the same subsea depth as in the Davis Ranch pool. The Stanolind well found the Lansing at 1,440 ft. with the Kansas City lime at 1,628-1,850 ft., the Mississippi at 2,471 ft., and the Kinderhook at 2,818 ft.

Linking of the Ringwald and Orth pools in Rice County, central Kansas, is indicated at Anderson-Prichard Oil Corp. 1 Heinz, SW SE SE 28-18-10, which is showing for a producer in Quartzite, logged at 3,143-55 ft. With hole open from 3,145 ft., where casing was cemented, the well swabbed 1½ bbl. of oil per hour. Hole is being deepened a few feet and formation will be shot for further testing. Showings also were found in the Topeka at 2,662-78 ft., the Lansing, topped at 2,854 ft., and the conglomerate, topped at 3,126 ft. Elevation is 1,750 ft. The location is in the narrow gap between the above pools, being about ¾ mile east of the former pool and about the same distance southwest of the latter.

Skelly Oil Co. is extending production of the Bredford pool, Stafford County, a half-mile west at its 1 Crane, NW NE SE 29-23-12. The well found good saturation in Arbuckle lime, topped at 3,855 ft. (—1,989 ft.). In a drill-stem test in this formation at 3,857-65 ft., it recovered 2,700 ft. of clean oil and 120 ft. of heavily oil-cut mud. Casing has been run to 3,857 ft.

KANSAS SUCCESSFUL WILDCATS

Butler County: W. L. Hartman 1 Pray, SE NW SW 31-27s-3e, 2,500,000 cu. ft. of gas per day from Stalnaker at 2,001-34 ft., TD 3,112 ft.

McPherson County: Texas Pacific Coal & Oil Co. 1 Krehbiel, SE SW SE 11-20s-3w, pumped 20 bbl. of oil per day from Mississippian at 3,015-56 ft., TD.

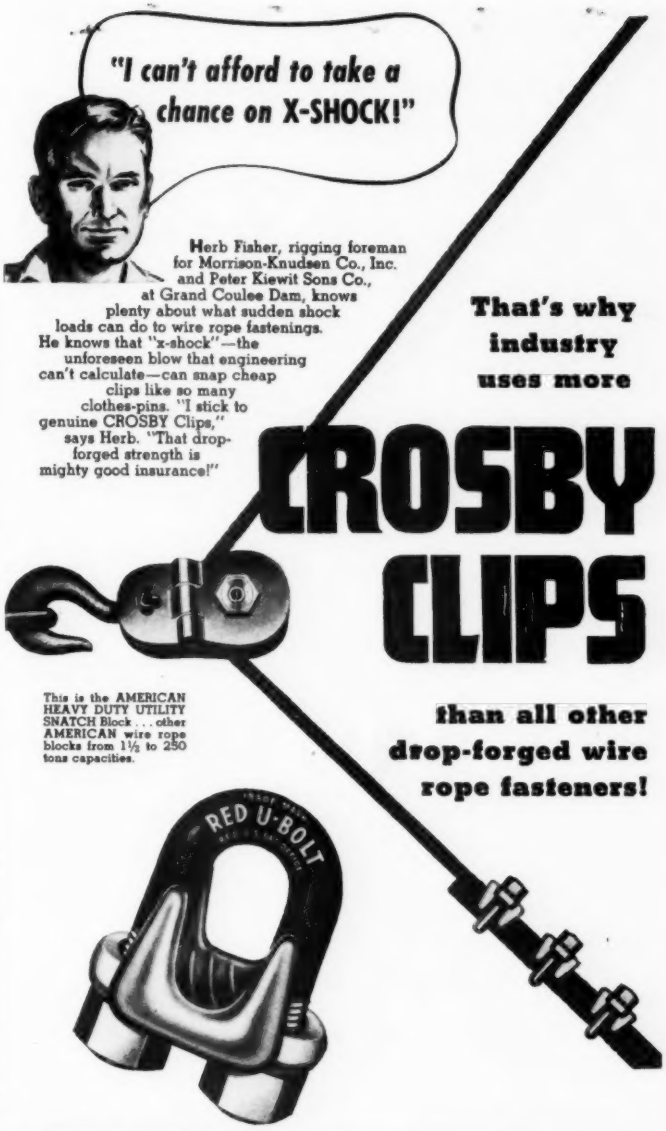
Russell County: Franco-Central Oil Co. 1 Kortman, SW SW NE 22-12s-14w, pumped 462 bbl. of 39°-gravity oil per day from Lansing at 2,961-3,260 ft., TD 3,280 ft.

Stafford County: Petroleum, Inc. 1 Koopman, NE NW NE 20-21s-13w, pumped 311 bbl. of oil per day from Arbuckle at 3,674-79 ft., TD.

KANSAS WILDCAT FAILURES

Barton County: Alpine Oil & Royalty Co., Inc. et al 1 Johnson, SW SW NE 29-19s-12w, dry, TD 3,450 ft., anhydrite 655 ft., lime 3,151 ft., Lansing 3,163 ft., conglomerate 3,406 ft.

Douglas County: Gerald Neuner 1 Thurber, NE NE NS 1-14s-17e, dry, TD 2,058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ft., Mississippian 1,638 ft., Hunton 1,950 ft., Kinderhook 1,880 ft., Viola 2,048 ft.

McPherson County: The Texas Co. 1 Pauls, SW SW NE 25-21s-5w, dry, TD 4,067 ft., Topeka 2,204 ft., Hozbar 2,514 ft., Lansing 2,717 ft., conglomerate 3,328 ft., Mississippian 3,382 ft., Kinderhook 3,648 ft., Misener 2,790 ft., Sylvan shale 3,792 ft., Simpson 3,832 ft., Viola 3,908 ft., Arbuckle 4,002 ft.

Russell County: Keys Drilling Co. 1 Theoman, SE SE SE 3-15s-13w, dry, TD 3,410 ft., anhydrite 832 ft., Tarkio 2,425 ft., Topeka 2,755 ft., Hoxbar 2,997 ft., lime 3,072 ft., Lansing 3,068 ft., conglomerate 3,377 ft.

TEXAS GULF COAST

New Oil Pool for Victoria County

HOUSTON—Minnie S. Welder has opened the new "Minnita" oil pool in Victoria County with completion of the 5 Minnie S. Welder, Phillip Dimmit Survey, 3 miles southeast of Victoria. The well was drilled to a depth of 5,360 ft. and 5½-in. casing set at 5,010 ft. Through perforations at 4,962-66 ft., the well flowed 63 bbl. of oil daily through a ⅛-in. choke, with tubing pressure of 1,000 psi. Pay was topped in the new discovery at 4,952 ft.

On the northeast flank of the South Liberty dome, Liberty County, L. M. Josey et al have opened new production with completion of the 17 Joseph Mitchell. Through perforations at 5,880-904 ft., the well was gaged for 232 bbl. of 37°-gravity oil daily through a ⅛-in. choke, with flowing pressure on the tubing of 975 psi. Hole is bottomed at 6,508 ft. and has 5¼-in. production casing set on bottom. This is the first production in the Lower Yegua "5 E-Y" zone in the entire field.

A new pay has been opened in the Lissie area of Wharton County by The Salt Dome Oil Corp. et al 1 Winnie M. Poole. The well gaged 59 bbl. of 33°-gravity oil daily through a ⅛-in. choke. Hole is bottomed at 7,171 ft. and production is through perforations at 6,370-78 ft. Tubing pressure was 250 psi.

Superior Oil Co. 1 fee has opened new pay in the South Gillock field, Galveston County, with a potential test of 254 bbl. per day through 3 16-in. choke from perforations at 9,035-53 ft. Tubing pressure was 900 psi. and the oil tested 38.6° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Galveston County: New pay at South Gillock—Superior Oil Co. 1 fee, John W. Lytle Sur., A-17, shore of Moses Lake, TD 11,582 ft., top pay 9,035 ft., perf. 9,035-53 ft., IP: 254 bbl. oil per day, 3 16-in. choke, TP 900, 38.6°-gravity.

Liberty County: New pay at South Liberty Stanolind Oil & Gas Co. 1 Frank Abshier, M. G. White League, TD 6,950 ft., top pay 6,734 ft., perf. 6,836-54 ft., IP: 155 bbl. oil per day, ⅛-in. choke, TP 1,250 psi., CP 1,600 psi., 38.7° gravity.

Victoria County: New oil pool "Minnita"—Minnie S. Welder 5 Minnie S. Welder, Phillip Dimmit Sur., 3 mi. SE of Victoria, top pay 4,952 ft., TD 5,360 ft., perf. 4,962-66 ft., IP: 63 bbl. oil per day, ⅛-in. choke, GOR 4,726, TP 1,000 psi.

Wharton County: New pay at Lissie—The Salt Dome Oil Corp. et al 1 Winnie M. Poole, GH&H RR Sur. 25, A-156, 2 mi. SW of Lissie, TD 7,171 ft., top pay 6,370 ft., perf. 6,370-78 ft., IP: 59 bbl. oil per day, ⅛-in. choke, GOR 830, TP 250 psi., 33° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Chambers County: Humble Oil & Refining Co. E-2 Galveston Bay State, "E" Lse. Tract 21-A, Galveston Bay, 4 mi. SW of Anahuac, 5 mi. NE of Fishers Reef, dry, TD 8,650 ft.

Lavaca County: Sterling Oil & Refining Co. 1 William Borchers, S. P. Middleton Sur., A-310, dry, TD 6,512 ft.

Victoria County: Grubb & Hawkins 1 Etta Terrell, J. B. Sideck Sur., A-108, dry, TD 5,523 ft.

John W. Mecom 6 Minnie S. Welder, Thomas Chapman Sur., A-491, 1 mi. S of Placedo field, dry, TD 8,668 ft.

ROCKY MOUNTAIN

NE Colorado Test Has Good Show of Oil

DENVER—Interest in the entire Denver-Julesburg Basin was increased again this week with the discovery of oil on drill-stem tests in the British-American Oil Producing Co. et al 1 Segelke, NE NW NE 26-11n-43w, wildcat in the Armstrong area, Logan County, Colorado. Top of the sand tentatively identified as Dakota was logged at 5,406 ft. and on 50-minute drill-stem test between 5,394-5,415 ft., the well made 420 ft. of light oil, 30 ft. of highly oil and gas-cut mud, and 180 ft. of clear brackish water. A second test with tool open 2 hours between 5,409-5,420 ft., showed 540 ft. of water and 300 ft. of light oil. British-American has drilled ahead to 5,616 ft., total depth, in the Lakota sand and has reportedly recovered oil on test of this zone.

This wildcat is of importance as the first in recent years to find oil and gas in northeastern Colorado. The well is approximately 20 miles southeast of the Ohio Oil Co.'s three fields producing oil and gas from sands in the Dakota series in Cheyenne County, Nebraska.

Complete data have not been released by the Ohio Oil Co. on its 1 McLernon, NE NE NE 9-14n-49w, the company's fourth wildcat in the Sidney area, Cheyenne County, Nebraska. Ohio now has 8 producing oil wells in the Gurley area, 2 gas wells in the Huntsman area, and one apparent oil discovery 3 miles northwest of Huntsman. The 1 McLernon is 2 miles east of the Huntsman discovery and drilling below 4,634 ft. It is reported that the well made 1,400 ft. of oil on tests of the first Dakota sand and found salt water in the base of that formation. Salt water was also tested in the second Dakota and the well is now drilling in the third Dakota sand. Meanwhile location has been made for another wildcat by Ohio with the well to be located in 25-14n-49w on the East Sidney High. Ohio has an estimated one million acres leased through western Nebraska and northeastern Colorado, and plans a series of wildcat wells throughout this entire area. There are probably ten million acres total under lease through the Denver-Julesburg Basin and more than 10 seismograph crews are working in the area. Superior Oil Co., the Texas Co., Sinclair Oil & Gas Co. and Stanolind Oil & Gas Co. hold extensive spreads in this play.

Good oil recovery was made by Phillips Petroleum Co. on tests in the Dakota sand on its second well in the Glenrock area, Converse County, Wyoming. The well is 1-A Glenrock, SW NE NW 5-33n-75w, a southern offset to the Glenrock field Muddy sand discovery well. Top of the Dakota was logged at 6,975 ft. and on drill-stem test between 6,998-7,040 ft. the well made 2,600 ft. of 32°-gravity oil in 45 minutes. Phillips is now running casing to complete the well. This well was the first to test Wall Creek production from the Glenrock field. In the Wall Creek sand Phillips recovered gas with a slight amount of distillate and the well made water from the second Wall Creek sand. There are now two Dakota sand producers and one Muddy sand well in this field with three wells nearing the pay zone.

WILDCAT FAILURE IN WYOMING

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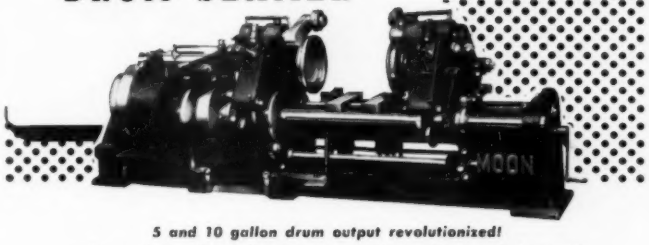

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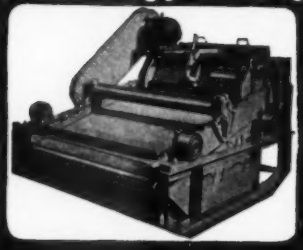

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LA.-ARK.

Lincoln Parish Well Ready to Test

SHREVEPORT. — Southwest Natural Production Co. 1 M. E. Colvin, 31-20n-2w, Lincoln Parish wildcat, had total depth at 9,000 ft., contract depth, ran electrical surveys and prepared to perforate and test in the Vaughn. Seven-inch casing was set on bottom. The Vaughn section was logged at 8,734 ft., and the Davis at 8,810 ft., on elevation of 167 ft. Cores from the Vaughn had some porosity, and drill-stem tests recovered gas and distillate-cut mud. A core in the Davis from 8,940-90 ft. recovered sand and shale with gas-distillate odor.

Sinclair Oil & Gas Co. 1 Vera Oden, Cotton Valley test 5 miles north of Bossier City, in Bossier Parish, was drilling below 6,209 ft., in the Travis Peak. A core from 5,606-56 ft. recovered 41 ft. of lime with no shows, and 3 ft. of slightly porous lime with very light oil show. The section was identified as the Pettit.

In the El Dorado field, Union County, C. H. Murphy & Co. 1 Sue Olson, 32-18s-15w, was coring at 6,837 ft. in the Cotton Valley. There was no report on recovery. A drill-stem test from 6,483-89 ft., in the upper Cotton Valley, recovered 2,930 ft. of gas and oil.

NORTH LOUISIANA WILDCAT FAILURES

Franklin Parish: H. B. Brown & Co. 1 S. J. Stout, SW SE 15-16n-9e, dry, TD 5,000 ft.

Ouachita Parish: V. V. Bull 2 F. W. Huenfield, SW NW SW 29-18n-5e, dry, TD 4,607 ft.

ARKANSAS WILDCAT FAILURE

Union County: British American Oil Co. 1 J. K. Sheppard, NE NE 15-19s-17w, dry, TD 8,731 ft., elevation 267 ft., Tuscaloosa 3,231 ft., Lower Cretaceous 3,327 ft., base massive anhydrite 3,411 ft., James 4,012 ft., Sligo 4,264 ft., Travis Peak 4,431 ft., Cotton Valley 5,990 ft., Smackover 8,529 ft.

EASTERN TEXAS

Smith County Strike Has Big Gas-Distillate Flow

DALLAS. — Bobby Manziel 1 John L. Campbell, Smith County gas discovery south of Tyler in the Robert Fletcher Survey, A-359, was reported to be good for 40,000,000 cu. ft. of gas a day, open flow, plus 30 bbl. per 1,000,000 cu. ft. of 66°-gravity distillate from perforations at 7,662-72 ft. in the Paluxy.

Earlier scout reports on tests from Paluxy perforations at 7,668-78 ft. had a daily flow rate of 3,100,000 cu. ft. of gas through ¼-in. choke. The flow was into pits, with the well making slugs of wash water and some condensate. On 5/16-in. choke, the well flowed at the daily rate of 4,800,000 cu. ft. of gas, under tubing pressure of 2,095 psi., and on ⅜-in. choke gaged 6,120,000 cu. ft. of gas daily. Shut-in pressure was 2,355 psi. R. J. Caraway and Delta Drilling Co. were said to be planning a ½-mile northeast offset.

EAST TEXAS (DISTRICTS 5, 6 AND 6-P) WILDCAT FAILURES

Denton County: D. H. Bolin et al 1 M. L. Moore, H. Tierwester Sur. A-1,241, 1

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mi. W Sanger, dry, TD 1,928 ft., Ellenburger 1,890 ft.

Taubert Drilling Co. 1 E. M. Rucker, H. Harman Sur., A-617, 6 mi. NW Krum, dry, TD 1,697 ft.

Witherspoon & McCarthy 1 Dr. J. M. Sullivan, G. T. Key Sur., A-717, 4 mi. SW Sanger, dry, TD 1,702 ft.

Gregg County: Joe Bander 1 G. P. Smith, Isaac D. Skillern Sur., 6 mi. W Longview, dry, TD 1,100 ft.

PERMIAN BASIN

New Strikes-Extensions Keep Reef Play Hot

MIDLAND.—Completion was made on one Borden County reef discovery, another well assured production 1¼ miles west of the Reinecke field, and in Kent County, potential test was being run on a Strawn discovery.

Barnsdall Oil Co. 1 W. L. Wilson, NE NE 16-27-H&TC, new field opener in southeastern Borden County, completed for a daily potential of 1,604 bbl. a day, through ½-in. choke on tubing set at 7,433 ft. Gravity of the oil was 47°, gas-oil ratio was 1,000 cu. ft. and flowing tubing pressure was 950 psi.

Castleman & O'Neill 1-A T. L. Griffin, approximately NE NE 51-25-H&TC, 1 mile west ond slightly north of the Geo. P. Livermore 1 Reinecke discovery, ran a drill-stem test from 6,847-89 ft., total depth, which had gas in 4 minutes, mud in 11 minutes and oil in 15 minutes. It flowed an estimated 60 bbl. of oil in about an hour, when tool was closed. Casing was run to 6,866 ft. On elevation of 2,366 ft., top of the reef was placed at —4,494 ft., or about 90 ft. low to the 1 Reinecke discovery.

In Kent County, General Crude Oil Co. of Houston 1-A Percy Jones, NE NE 79-G-W&NW, on the southwest edge of Clairemont, flowed 384 bbl. of 38.7°-gravity oil on potential test, through ¼-in. choke from Strawn lime pay at 6,742-52 ft. The section was open hole. Completion potential was based on an actual flow test of 13 hours which produced 207 bbl. of oil, with tubing pressure of 600 psi, and gas-oil ratio of 401 cu. ft. Five and one-half inch casing was set on top of pay at 6,742 ft.

Northwest of Clairemont, Caroline Hunt 1 J. W. Young, Canyon reef discovery, was waiting on storage. At total depth of 7,230 ft., an attempt was made to treat with 1,000 gal. of acid through perforations from 6,484-6,520 ft. but the formation took only 500 gal., when it kicked off and flowed an average of 36 bbl. of oil an hour.

In Midland County, 4½ miles south of the Warfield Ellenburger field and 13½ miles north of the Pegasus Ellenburger field, Magnolia Petroleum Co. 2 Roy Parks, NW NW Section 10, M. C. Daugherty Survey 10, was running electrical surveys to 10,690 ft. On elevation of 3,835 ft., it topped the Pennsylvanian at 10,060 ft., and on a 26-minute drill-stem test from 10,398-468 ft., gas showed in 5 minutes, mud in 66 minutes, and oil in 67 minutes. The well was cleaned into pits for 19 minutes then turned into tanks, gaging 23 bbl. of 44°-gravity oil in 2 hours though ⅝-in. bottom and 1-in. top chokes. Gas-oil ratio was 1,738 cu. ft. Final recovery was estimated to be 2,800 ft. of oil and 500 ft. of oil and gas-cut mud.

In Runnels County, Hiawatha Oil & Gas Co. and Plymouth Oil Co. 1 Tad Richards, G. Villareal Survey 280, extended production 1¼ miles south of the Fort Chadbourne field with a flowing potential of 165 bbl. of 45°-gravity oil daily, through 3/16-in. choke. Total depth was 5,302 ft., with top of pay at 5,249 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Gaines County: Humble Oil & Refining Co. 1 E. B. Bailey, SE NW 6-A10-PSL, 5 mi.

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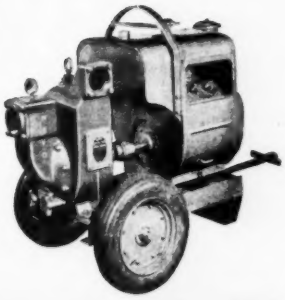

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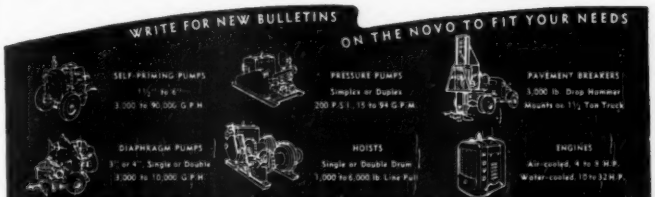

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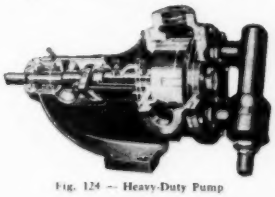

Fig. 124 — Heavy-Duty Pump

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E Hobbs field, New Mexico, ½ mi. W Mid-Continent 1 Nichols, Glorietta discovery; TD 6,460 ft., PB 5,858 ft., elevation 3,597 ft., top San Angelo 5,810 ft., pay 5,845 ft., IP pumped 239 bbl. 36.5°-gravity oil, 33 bbl. water, GOR 46 cu. ft., suggested name East Hobbs 5,900-ft. field.

Kent County: Drilling & Exploration Co., Inc. 1 Wilson Connell, NE NE 19-5-H&GN, 2 mi. SE Polar, TD 7,931 ft., elevation 2,371 ft., PB 2,350 ft., San Andres pay 2,340 ft., IP pumped 12 bbl. oil, plus 85 per cent water, 33° gravity, GOR 300 cu. ft.; Pennsylvanian 7,001 ft., reef 7,004 ft., Strawn 7,128 ft., Ellenburger 7,740 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Coke County: Amerada Petroleum Corp. 2 March Ranch, 37-2-D&SE, 2½ mi. E No. 1, dry, TD 7,315 ft., elevation 2,383 ft., San Angelo 940 ft., Clear Fork 1,066 ft., Wolfcamp 2,290 ft., Pennsylvanian 3,950 ft., Ellenburger 6,988 ft.

Crockett County: C. C. Daniel 1 R. L. Childress Estate, 5-CD-D&SE, 12 mi. NE Ozona, dry, TD 945 ft.

Crosby County: Gulf Oil Corp. 1 C. F. Martin, A. D. Meyer Sur., A-1,271, Blk. B, 10½ mi. W Spur, dry, TD 8,435 ft., elevation 2,519 ft., Glorietta 2,660 ft., Strawn 7,382 ft., Pennsylvanian 7,420 ft., pre-Cambrian 8,420 ft.

Gaines County: The Texas Co. 1 Mrs. A. Mickle, NE NW 21-A25-PSL, 3½ mi. SW Doss field, dry, TD 7,760 ft., elevation 3,376 ft., San Andres 4,590 ft., Glorietta 6,090 ft., Clear Fork 6,250 ft., Tubbs 7,000 ft.

Irion County: Parker Petroleum Co. 1-B Harris, 72-6-H&TC, dry, TD 1,953 ft., elevation 2,563 ft., Yates 915 ft., Big Red shale 1,620 ft., lime 1,797 ft.

Reeves County: Gulf Oil Corp. et al 1 H. T. Collier, NE NE 31-51-T8-T&P, 7 mi. SE Verhalen, dry, TD 5,313 ft., elevation 2,831 ft.

Runnels County: Jake Freedman & Geo. W. Strake 1 M. P. Turner, J. Early Sur. 449, 2¼ mi. SW Wingate, 3 mi. S. Ft. Chadbourne field, dry, TD 5,536 ft., elevation 2,047 ft., Canyon lime 4,563 ft., sand 5,100 ft., Caddo 5,224 ft., tentative Ellenburger 5,388 ft.

Sutton County: C. L. Norsworthy, Jr. 1 O. W. Cardwell, NW NE 69-SPRR Sur., 33 mi. SE Sonora, dry, TD 4,310 ft., elevation 2,277 ft., Strawn 4,115 ft., Ellenburger 4,233 ft.

Tom Green County: Sun Oil Co. 1-A M. B. Pulliam, Sec. 196, J. Seiler Sur., 3½ mi. NE 2 Pulliam, dry, TD 5,416 ft., elevation 1,880 ft., reef lime 5,335 ft.

SOUTHEAST NEW MEXICO

HOBBS.—Honolulu Oil Corp. 1 State, wildcat 18 miles east of Roswell in Chaves County, 13-11s-27e, retreated with 1,000 gal. of acid, then swabbed and flowed at the rate of 30 bbl. of 39.7°-gravity oil an hour, cut 3 per cent with acid water. Following that it flowed 66 bbl. of oil in 4 hours through open tubing, and 144 bbl. of oil in 21½ hours through 11 32-in. choke. Total depth was 6,933 ft., plugged back to 6,563 ft. Amerada Petroleum Corp. completed its 2-BTD State, 35-11s-33e, as a northeast extension to the Bagley field for 538 bbl. of 46°-gravity oil in 24 hours, through ½-in. choke. Completion was from open hole in the Devonian at 10,960-975 ft.

On the southwest side of the Bagley field, Amerada 1 Simmons, NW NW 11-12s-33e, recovered water blanket and 90 ft. of drilling mud with no shows, on a drill-stem test from 10,944-990 ft. The well has shown for a possible producer higher in the hole. Top on the Mississippian was 10,395 ft.

Stanolind Oil & Gas Co. 2-A Anna Foster, NE SW 23-19s-38e, 1½ miles southeast of San Andres production in the Hobbs field, ran a 2-hour drill-stem test from 6,940-7,036 ft. Recovery was 90 ft. of oil and gas-cut mud. A second 2-hour test from 7,050-7,105 ft. recovered 360 ft. of slightly oil and gas-cut mud. It topped the Glorietta at 5,600 ft. and the Tubbs at 6,610 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Shell Oil Co. 1 P. Carter (was 1 W. B. Lawrence), SE SW 32-17s-39e, dry, TD 14,044 ft., elevation 3,646 ft., Pennsylvanian 10,500 ft., Mississippian 11,270 ft., Woodford 11,770 ft., Devonian 11,870 ft., Silurian 12,820 ft., Montoya 13,285 ft., Simpson 13,580 ft., McKee 13,730 ft., Ellenburger 13,900 ft., pre-Cambrian 14,010 ft.

N. CENTRAL TEXAS

Wise Co. Strike Flows 7 Bbl. Per Hour After Acid

WICHITA FALLS.—Cities Service Oil Co. 1 S. Williamson, Falls County School Land Survey, Wise County wildcat 5 miles northwest of Alvord, was swabbing in an attempt to flow. Last 24-hour gage was a recovery of 168 bbl. of 39.5°-gravity oil, plus 29 bbl. of acid and drilling water, following a 500-gal. treatment through casing perforations in the Ellenburger from 7,277-88 ft. Recovery during the last 10 hours on the test was said to be clean oil, with no water.

Falcon-Seaboard 1 Troy Douthitt, Lot 106, Section 23, an east offset to the 1 Williamson, was drilling ahead below 2,650 ft. in shale. Sinclair Oil & Gas Co. 1-A Katie Douthitt, in the north half of Lot 85, and a north offset to the discovery, was drilling below 5,005 ft. in shale and lime.

North of Cottondale in Block 82, Lower Matagorda CSL Survey, A-534, Wise County, Signal Oil & Gas Co. 1 J. I. Gentry bailed 2½ bbl. of oil an hour from 1 ft. of Strawn lime topped at 3,584 ft. Gravity of the oil was 37°. Operators were setting 7-in. casing.

In Jack County, C. S. Atchison and others completed the 1 F. W. McClelland, semi-wildcat 6 miles northwest of Jacksboro in the C. Vandever Survey, A-867, as a Mississippian extension to the Lester field. Initial potential was 38 bbl. of 46°-gravity oil a day, following a 3,000-gal. acid treatment through 10 64-in. choke. Flowing pressures were 900 psi. on casing and 100 psi. on tubing. Pay was from 5,404-35 ft.

Hanlon-Boyle, Inc. 1 Laura Norman, wildcat 5 miles southwest of Bryson and 2 miles south of the Bryson field, S. R. Holly Survey, A-1,748, had total depth at 4,400 ft. and operators were preparing to run 5½-in. casing.

In Montague County, 3 miles south of Nocona, B. F. Phillips, Jr. 1 W. M. Brooks, MEP&P Survey, A-517, was testing in the conglomerate, with total depth at 5,874 ft. Casing had been set at 5,859 ft. and when plug was drilled it swabbed an unestimated amount of oil and gas.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Shackelford County: Starr Oil & Gas Co. 2 J. D. Windham "H," 80-12-T&P, 15 mi. SW Albany, TD 1,275 ft., pay 1,253 ft., elevation 1,849 ft., IP pumped 30 bbl. 39.6°-gravity oil a day.

Stephens County: Warren Oil Corp. 1 J. M. Farnbrough, 33-6-T&P, 4 mi. NW Frankell, TD 4,225 ft., elevation 1,418 ft., PB 3,996 ft., pay 3,932 ft., IP 8,600,000 cu. ft. gas a day, SIP 1,480 psi., top Caddo 3,250 ft.

Young County: Neal Elder 1 Edna Crumpton & Gladys Williams, T. H. Woodley Sur., A-1,654, 6 mi. SE Bunger, TD 3,200 ft., elevation 1,260 ft., pay 2,770 ft., IP 1,100,000 cu. ft. gas a day.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: M. W. Blair 1 Fannie M. Byrd, Blk. 14, W. E. Probert Subd., 2 mi. NE Megargel, dry, TD 1,604 ft.

Bridwell Oil Co. 1 L. F. Wilson estate "L," Wm. Walker Sur., A-660, 6 mi. N Archer City, dry, TD 4,041 ft.

Neeld & Hood Drilling Co. 6 J. S. Brid-

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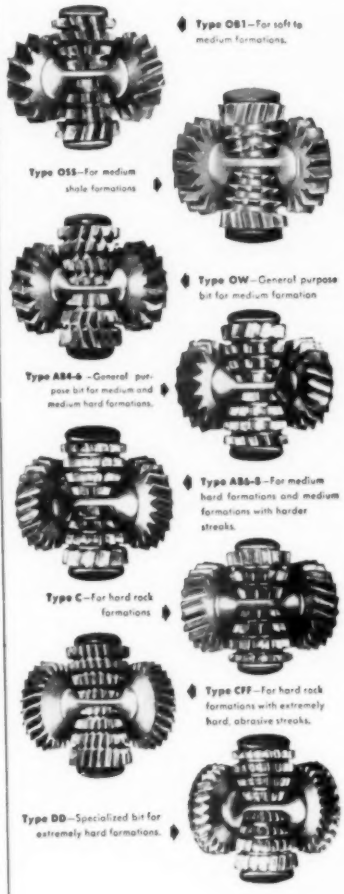
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well, Blk. 16, Wm. B. Aldridge Sur., A-2, 5 mi. NE Geraldine, 320 ft. S No. 5, dry, TD 1,606 ft.

Baylor County: Neeld & Hood 1 F. C. Green, Blk. 230, T&NO Sur., A-1,508, 2 mi. SE Bendham, dry, TD 3,152 ft.

Neeld & Hood 1 R. W. Fails, Sec. 3,149, TE&L Sur., 1 mi. E Round Timber, dry, TD 1,800 ft.

Clay County: G. W. Cooper 1 Lewis, Sec. 14, M. Gross Sur., A-155, 5 mi. SE Blue Grove, dry, TD 4,712 ft., elevation 933 ft.

Coleman County: George Keith, Jr. 1 O. C. Wallace, Blk. 6, Wm. Farris Sur. 279, 7 mi. S Santa Anna, dry, TD 1,705 ft.

Jack County: H. N. Crocker Drilling Co. 1 L. A. Worthington, SA&MGRR Sur., A-589, 6 mi. S Post Oak, dry, TD 2,370 ft., elevation 965 ft.

Jones County: W. C. Chappell 1 Seth W. Lawrence, Blk. 16, McMullen & McGloin Sur. 336, 7 mi. NW Anson, dry, TD 4,870 ft., elevation 1,724 ft.

Schwab, Witherspoon et al 1 A. J. Barbee, M. Northington Sur. 270, 2½ mi. NE Noodle, dry, TD 2,679 ft., elevation 1,743 ft.

Knox County: Frank Wood & Bros., Inc. 1 J. W. Goode, 1-46-H&TC, 4 mi. S Goree, dry, TD 2,005 ft.

Lampasas County: H. C. McAuley 1 Dorothy Hardy May, Willis Avery Sur. 46, 10 mi. N Lometa, dry, TD 1,650 ft., elevation 1,200 ft., Ellenburger 702 ft.

Mills County: Deep Well Oil Corp. 1 V. C. & T. O. Segelquist, Christopher Chaney Sur., 11 mi. SE Goldthwaite, dry, TD 2,815 ft., elevation 1,409 ft., Marble Falls 1,925 ft., Ellenburger 2,580 ft.

Montague County: J. A. Chapman 6 M. Fowler "A," Blk. 18, Limestone CSL, 2 mi. NE Stoneburg, dry, TD 5,006 ft.

Shackelford County: H. F. Pettigrew 1 G. R. Davis, Sec. 217, ETRR Sur., 3½ mi. SE Lueders, dry, TD 1,965 ft., elevation 1,640 ft.

Stephens County: R. W. Fair and Don L. Choate 1 M. C. Graham, Sec. 88-4-T&P, 8 mi. NW Strawn, dry, TD 1,784 ft.

Taylor County: Hedrick Oil Co. 1 W. M. Hayes, Blk. 16, Lge. 124, Grimes CSL, 3 mi. NE Merkel, dry, TD 2,954 ft., coal 2,480 ft., Flippen 2,486 ft., reef 2,875 ft.

Throckmorton County: E. E. Scannell 1 L. B. Wyly, Sec. 2,235, 3 mi. SE Woodson, dry, TD 405 ft.

Wise County: Akin & Dimock 1 W. M. Kinsey, Blk. 5, J. M. Mora Sur., A-541, 3½ mi. SE Cottondale, dry, TD 5,870 ft., conglomerate 5,787 ft.

Deep Well Oil Corp. 1 M. M. Dean, Blk 2, Thomas Denson Sur., A-239, 3½ mi SE Bonnsville, dry, TD 6,265 ft., no tops.

Young County: R. S. LeSage 1 T. J. Routon, Sec. 131, TE&L Sur., A-428, 10 mi. SW Olney, dry, TD 4,997 ft., elevation 1,231 ft.

Ted Weiner 1 Jess Hawkins, Sec. 470, Texas Emigration & Land Sur., 6 mi NW Graham, dry, TD 4,795 ft., Caddo 3,841 ft., Mississippian 4,778 ft.

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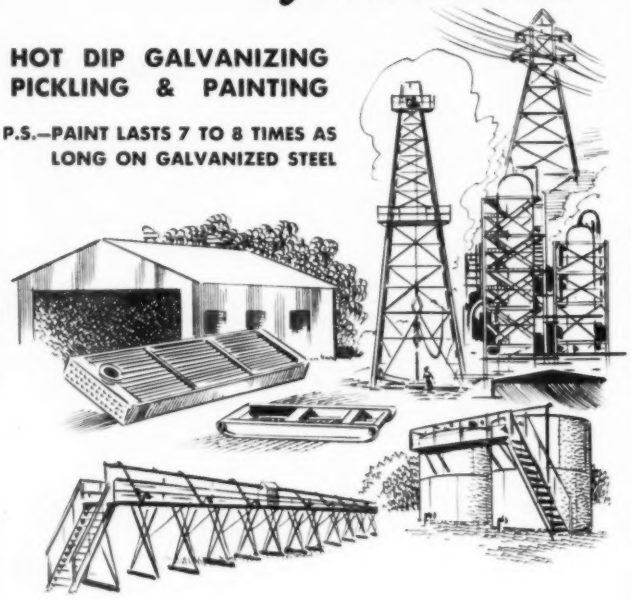

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MISSISSIPPI

Tests Near Interesting Stage With Shows

JACKSON.—Humble Oil & Refining Co. has encountered a possible new producing sand in the 1 Lucy E. Barksdale, 26-5n-3w, Adams County, Mississippi. A sand stringer was encountered from 6,525-33 ft. and 6,571-78 ft. Operators set 7-in. casing at total depth, 6,581 ft., and perforated 6,571-73 ft. with 16 shots. The well reported a flow of 14 bbl. of oil per hour on drill-stem test using ¼-in. top and 3/16-in. bottom choke. At the end of 47 minutes tubing pressure built up to 825 psi, and then leveled off to approximately 550 psi.

Pan-Am Production Co. is now preparing to swab the 1 S. J. Holloway, 26-6n-6e, West Lincoln field, Lincoln County, Mississippi. Casing was perforated at 10,672-84 ft. and the well flowed a small stream of oil through a 30/64-in. choke. However, it is believed that the oil produced during the test was oil used in washing the well and not from the formation. From coring and electrical log, a 28-ft. sand section was established from 10,652-80 ft., with the sand body in a stringer section of the lower Tuscaloosa series.

Union Producing Co. has run a drill-stem test in the 1 Claude Smith, Sherron field test, Jones County, Mississippi, and recovered gas from 5,443-70 ft. Top of second City Bank sand was encountered at 5,443 ft. The Stanley zone was topped at 5,493 ft. and a drill-stem test was run at 5,490-532 ft., using ¼-in. top and ⅜-in. bottom chokes. Recovery was an unestimated amount of gas, 15 ft. of condensate mud and no water. Structurally, the Stanley zone is 17 ft. higher than in the discovery well for the field, and indications are that the Union well will be a somewhat better well.

MISSISSIPPI WILDCAT FAILURES

Adams County: Humble Oil & Refining Co. 1 Richmond Corp., 24-7n-3w, dry, TD 10,580 ft.

Barnett Serio 1 C. F. Engle et al, 11-5n-2w, dry, TD 6,750 ft.

Southeastern Drilling Co. and J. R. Brown 1 Greenfield Plantation, 48-7n-2w, dry, TD 7,210 ft.

Neshoba County: Clyde Creighton 1 E. B. Estes, 24-9n-11e, dry, TD 4,326 ft.

ALABAMA WILDCAT FAILURE

Conecuh County: John S. Neilson 1 W. G. Brantley, 19-6n-10e, dry, TD 5,012 ft.

FLORIDA WILDCAT FAILURE

Taylor County: Gulf Refining Co. 1-A Brooks-Scanlon, Inc.-Block 37, 17-6s-9e, dry, TD 4,876 ft.

OKLAHOMA

Mile Extension Indicated For Southwest Maysville

EXTENSION of Gibson sand production of Southwest Maysville pool, Garvin County, a mile to the west is in prospect at W. E. Anderson and Phillips Petroleum Co. 1 Rill, C NE NW 34-4n-3w. Gibson sand was found at 7,012 ft., and in a drill-stem test at 7,013-65 ft., gas was at the surface in 9 minutes after the tester was opened, oil showed within 21 minutes, and for the remaining 20 minutes of the test flowed at an estimated rate of 25 to 30 bbl. per hour. No water showed. Indicated bottom-hole pressure was 900 psi. and shut-in pressure built up to 2,500 psi. Operators are deepening the hole for a look at lower zones before attempting completion.

The well is located in the gas between Southwest Maysville and Southeast New Hope pools, being about a mile south of production of the latter pool. It also is northwest of current operations in Southwest Antioch pool, and opens the way for considerable new development between the three areas.

Fordee Rhoades Oil Co. 2 Cain-Taylor, C SW NW 36-2n-2w, west of production in the northwest part of Katie pool, also in Garvin County, flowed at the rate of 100 bbl. of oil per hour in a drill-stem test of Layton sand. Test was of an interval at 5,612-30 ft. with Layton topped at 5,610. In the test gas showed in 5 minutes and oil within 17 minutes after the tester was opened. When tester was pulled, 1,170 ft. of free oil and 30 ft. of mud was recovered. Hole is being drilled to the Gibson sand, main producing zone of the field.

Testing is under way at Sinclair Oil & Gas Co. 2 Sullins, NE NW NE 12-23n-1w, 1½ miles north of the elongated South Ceres pool, Noble County. The well was swabbed down and 33 bbl. of oil recovered. It then swabbed 67 bbl. of clean oil in 18 hours with 2,000 ft. of oil in the hole. Later it headed and made 44 bbl. in 30 minutes. Operators are preparing to apply a hydrafrac treatment. Production is from the Red Fork zone, producing horizon of South Ceres pool. Total depth is 4,469 ft. with hole open from 4,414 ft.

Extension of this pool another location northward is in prospect at British-American Oil Producing Co. 3 Schultz, SE NE NW 13-23n-1w, which found good staining and odor in the Burbank (Red Fork) sand, topped at 4,378 ft. Hole was cored and drilled to 4,446 ft., and casing is being run to test.

A rank wildcat located a mile east of Courtney, in Love County, southern Oklahoma, has found good oil saturation in Deese sand but is drilling ahead in exploration of lower horizons. It is Coronado Oil Co. 1 Spivey, C SW SW 23-7s-3w. Deese sand was found at 6,424 ft. Tight sand with oil saturation was cored to 6,435 ft. In a drill-stem test of this interval, 45 ft. of oil-cut mud was recovered. An additional core to 6,445 ft. recovered 5 ft. of sand showing saturation and bleeding and 5 ft. of shale.

Wood Oil Co. and Flynn Oil Co. are testing their 1 Eaton, SW NE SE 35-19n-4e, as the discovery well of a new Red Fork sand pool in eastern Payne County. Bailed down after plug was drilled out, the hole then filled 400 ft. with oil. Later the well bailed 40 bbl. of oil in 12 hours.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Steelman 1 Baldwin, SE NE NE 34-1n-1e, pumped 30 bbl. of 30°-gravity oil per day from sand at 2,490-2,542 ft., TD.

Pontotoc County, Allen district: Jones & Shelburne 1 Beck, NE SE NW 31-5n-8e, flowed 2,500,000 cu. ft. of gas per day from second Booch at 2,239-49 ft., TD.

OKLAHOMA WILDCAT FAILURES

Carter County: NW Hewitt area: Continental Oil Co. 1 Carr, SE NE SE 6-4s-2w, dry, TD 7,000 ft., Deese sand 5,450 ft., Tussy sand 6,605 ft., geological wildcat.

Creek County, Pickett Prairie area: Jackson 1 Barnett, NW SE NW 7-16n-11e, dry, TD 2,945 ft., Bartlesville 2,030 ft., Tannehah 2,466 ft., no Dutcher, Mississippian 2,614 ft., Woodford 2,877 ft., Viola 2,905 ft., dolomite 2,915 ft., sandy dolomite 2,927 ft., Wilcox 2,936 ft.

Garvin County Breco Oil Co. 1 Masters, SE SE NE 12-4n-3e, dry, TD 1,993 ft., Belle City 1,570 ft., base Pennsylvanian-top Simpson 1,980 ft.

Blue Bonnet Oil Co. 1 Brawer, NW SW NW 13-4n-3e, dry, TD 2,051 ft.

Greer County: Pinkston 1 McLeod est., SE SW SW NW 32-6n-21w, dry, TD 803 ft. in brown shale and granite wash.

Kay County: Continental Oil Co. 1 Geo. Wolfe, SW SW SE 10-26n-1e, dry, TD 4,354 ft.

Kiowa County, Komalty area: ABC Drilling Co., Inc. 1 Rowland, NW NW NW 11-6n-17w, dry, TD 813 ft.

An-Son Petroleum Corp. 1 Tomah-ty, SE SW NW 8-6n-18w, dry, TD 1,182 ft.

Lincoln County: Blackwell Oil & Gas Co. 1 Warren, SE SE NE 3-13n-5e, dry, TD 4,865 ft. in white Wilcox sand.

Nelson Drilling Co. 1 Manning heirs, NW SE SE 28-14n-5e, dry, TD 4,110 ft., Avant 1,970 ft., Dewey 2,130 ft., Hogshooter 2,365 ft., Layton 2,460 ft., Checkerboard 2,730 ft., conglomerate 2,745 ft., Oswego 3,548 ft., Prue 3,568 ft., with slight show of oil, Verdigris 3,676 ft., Skinner 3,745 ft., Red Fork 3,895 ft., Bartlesville 4,050 ft.

Murray County: Carlock 2-B Littleton, NW NW SE 31-1n-3e, dry, TD 1,168 ft.

Okfuskee County: G. F. Martin 1 Whitefield, NE SE NE 28-11n-9e, dry, TD 4,055 ft., Wewoka 772 ft., Senora lime 1,925 ft., Olympic sand 1,930 ft., Inola 2,635 ft., Bartlesville 2,650 ft., lime 2,868 ft. and 2,922 ft., Booch 3,051 ft., Gilcrease 3,202 ft., Gilcrease sand 3,250 ft., 3,275 ft., and 3,305 ft., Union Valley 3,499 ft., Cromwell 3,516 ft., Mississippian 3,612 ft., Woodford 4,010 ft., Hunton 4,033 ft.

Payne County: Francis Oil & Gas Co. 1 Ross, NE NE SE 22-18n-2e, dry, TD 4,501 ft., Pawhuska 1,285 ft., Lecompton 1,662 ft., Osage Layton 3,040 ft., Hogshooter 3,332 ft., Layton 3,362 ft., Checkerboard 3,654 ft., Big lime 3,987 ft., Oswego 4,067 ft., Prue 4,134 ft., Verdigris 4,171 ft., Skinner 4,288 ft., lime 4,313 ft., Mississippian 4,485 ft.

Pittsburgh County: Intex Oil Co. 1 McEvoy, NE NW NE 16-5n-17e, dry, TD 3,014 ft. in Atoka.

Pottawatomie County: Porter Oil & Gas Co. 1 Doebbling, SE SE NE 33-10n-5e, dry, TD 4,580 ft., Calvin 3,108 ft., Earlsboro 3,280 ft., lower Earlsboro 3,378 ft., lime 3,900 ft. (?), Mayes 3,995 ft., Woodford 4,100 ft., Misener 4,210 ft., no Hunton, Sylvan 4,220 ft., Viola 4,308 ft., dolomite 4,413 ft., sandy dolomite 4,418 ft., first Wilcox 4,430 ft., sandy dolomite 4,530 ft., second Wilcox 4,540 ft.

Pushmataha County: Tom Lott 1 DeBogory, NE SE NE 26-1n-17e, dry, TD 525 ft.

Seminole County: Mid-Continent Petroleum Corp. 1 Walker, SE NE SW 26-8n-7e, dry, TD 3,540 ft., lower Wewoka 1,373 ft., upper Calvin 1,603 ft., middle Calvin 1,745 ft., lower Calvin 1,875 ft., Senora lime 2,190 ft., upper Senora sand 2,210 ft., lower Senora sand 2,246 ft., Thurman 2,500 ft., Earlsboro 2,720 ft., Bartlesville 2,865 ft., lime 3,075 ft., Booch 3,183 ft., Gilcrease 3,261 ft., Union Valley lime 3,356 ft., upper Cromwell 3,401 ft., lower Cromwell 3,488 ft.

Stephens County: Davon 1 Simmons, NW NW SW 35-2s-8w, dry, TD 5,476 ft., Viola 5,250 ft.

Tillman County, Frederick area: McCaughey 1 Hinson, SW NW SW 27-2s-17w, dry, TD 3,500 ft., sand 3,176 ft., Canyon 3,228 ft.

CALIFORNIA

New Field Assured In Cuyama Valley

LOS ANGELES.—The third new field for the Cuyama Valley was assured when Superior Oil Co.'s new discovery, 18-2 Government, in 2-11n-28w, tested at the rate of 390 bbl. daily, flowing 38°-gravity oil. With 8⅝-in. casing set at 5,624 ft. and 6⅝-in. liner landed at 6,125 ft., unofficial reports gave production as coming from perforations between 5,625 and 6,105 ft. Superior is rigging up for a north offset, while to the southwest, in NE Section 10, Southern California Petroleum Corp. is rigging up for its 81 Shlaudeman.

Slightly over ½ mile southwest of the discovery, Hancock Oil Co. was fishing for drill collars in its 65-10 Hancock-Oceanic. Earlier in the week the possible extentioner made a drill-stem test between 1,765 and 1,902 ft., where some 100 ft. of oil sand stringers were encountered in shale. A weak gas blow was shown throughout the test, and some 400 ft. of 31°-gravity oil recovered, but operator resumed drilling toward the main Cuyama pay.

In the Lost Hills area, in Section 11-26s-20e, General Petroleum has resumed drilling in its deep test, the 33-11 Williamson. Lost drill pipe was successfully recovered and at last report hole was being made below 10,810 ft.

North of the Goleta field in Santa Barbara County, L. H. Cameron has staked location for a wildcat. The test, No. 1 Marty, will be in SW 34-5n-29w.

(Previous completions)

CALIFORNIA SUCCESSFUL WILDCATS

Ventura County, Tapo Canyon area: John

LEGAL

NOTICE OF SALE: Notice is hereby given that the Department of Banking of the State of Nebraska as the duly authorized and acting receiver of the Midland Savings Bank of Lincoln, Nebraska, will sell the following described real estate, without reservation of mineral or other rights, but subject to all existing grazing leases, at public auction at the main entrance to the Harris County Courthouse at Houston, Texas, at 2:00 P. M. on Wednesday, the 19th day of April, 1950: Four Hundred Twenty-Two (422) acres of land in Section Eight (8), Block Six (6), I. & G. N. R. R. Company Survey described by metes and bounds according to the E. N. Gustafson Survey of February 7th, 1913, as follows: BEGINNING on the bank of East Carancahua Creek where the lower or South line of said Section Eight (8) intersects said Creek; THENCE East 2295.2 feet; THENCE North 2241.3 feet; THENCE East 2602 feet; THENCE North 1992 feet; THENCE West 5785 feet; THENCE South 2180 feet; THENCE WEST to East Carancahua Creek and down its meanders to the place of beginning; all of said land being located in Matagorda County, Texas. The sale of said land will be held open for one (1) hour. The property will be sold to the highest bidder therefore, whose bid must be reduced to writing and must be accompanied by a certified check or cash in the amount of at least fifty per cent (50%) of the bid price. The receiver reserves the right to reject all bids, and all bids shall be subject to confirmation by the District Court of Lancaster County, Nebraska. In the event of such confirmation the receiver shall deliver a standard receiver's deed to the purchaser, without warranty of any nature whatsoever, conveying the fee simple title to said property to the purchaser, specifically subject to all encumbrances and restrictions of record, and to all existing grazing leases. At said time receiver shall also deliver such abstracts of title to the property as it now has in its possession. Upon the delivery of said deed the purchaser shall simultaneously therewith pay to said receiver or its duly authorized agent the balance of the purchase price. THE DEPARTMENT OF BANKING OF THE STATE OF NEBRASKA, Receiver of the Midland Savings Bank, Lincoln, Nebraska, By: BEGHTOL & RANKIN, Its Attorneys; 714 Stuart Building, Lincoln, Nebraska.

McQuaid 1 Tapo, 13-3n-18w, midway between Tapo Canyon and Simi fields and 3 miles from production, pumped 41 bbl. of 21.2°-gravity oil, 3 per cent cut, TD 542 ft., elev. 1,918 ft.

San Bernardino County, Chino Hills area: Royalty Service Corp. Well 32-1, 32-2s-8w, 5 miles southwest of Chino, pumped 24 bbl. of 24°-gravity oil, 2 per cent cut, TD 1,944 ft., elev. 1,195 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, South Mount Poso area: George W. and Frank L. Ring 1 Mon, NE 4-28s-28e; dry, upper Vedder 2,454 ft., lower Vedder 2,725 ft., TD 2,743 ft., elev. 661 ft.

Los Angeles County, Saugus area: Lytle Exploration 1 Newhall Land & Farming Co., 22-4n-16w, dry, Pico 6,380 ft., Miocene 7,800 ft., Mohnian 8,880 ft., conglomerate 9,400 ft., TD 9,735 ft., elev. 1,175 ft.

Santa Barbara County, West Cuyama area: The Texas Co. 1 Russell, NW 21-11n-28w; dry, TD 639 ft., elev. 1,827 ft.

San Luis Obispo County, Atascadero area: Santa Lucia Oil Co. 1 Santa Lucia, 1-28s-12e, dry, TD 450 ft., elev. 929 ft.

Yolo County, Woodland area: Natural Gas Corp. 1 Yolo unit, 32-10n-1e, dry, TD 4,100 ft., elev. 68 ft.

MICHIGAN

Traverse Strike Makes Good Flow on Test

MOUNT PLEASANT.—Following acidization with 200 gal., Sun Oil Co. 1 Wood, NW SW SE 19-12n-13w, Traverse oil strike in Garfield Township, Newaygo County, flowed 161 bbl. of net oil in 20 hours. After being closely restricted for 48 hours while bottom-hole pressure and oil-gas ratio tests were run, well produced 107 bbl. in 24 hours through a 11/64-in. choke.

First follow-up test to this potential new Traverse discovery, Sun 1 Hubbard et al, SE SE SW 19-12n-13w, diagonal southwest offset, was scheduled to reach pay soon.

Ford Oil Co., discoverer of the shallow Traverse East Pullman oil pool, Allegan County, announced that 5 offset locations to producing wells had been staked in this new play. Two of the 5 offsets had been spudded. This field appeared to be destined for one of the most active drilling campaigns of any area in the state during the early summer of 1950. There have been 6 producing wells completed in the pool to date. Production is from the Traverse lime formation at about 1,135 ft., total depth.

On early production tests, after reacidization with 15,000 gal., Superior Oil Co. 1 Kenyon, NE NW SW 12-20n-1w, Richfield zone oil discovery in Butman Township, Gladwin County, pumped 50 bbl. of new oil first 24 hours. The next day well pumped and flowed 82 bbl. of oil and 350 bbl. of acid water. The third day well pumped 36 bbl. of oil in less than 24 hours. Prior to reacidization well had been averaging from 33 to 35 bbl. a day by pumping. This deep zone discovery is being produced from the Richfield at a plug-back depth of 4,985 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Casco Township: Ford Oil Co. 1 Militello, SW NW SE 35-1n-16w, Traverse 1,124 ft., dry, TD 1,128 ft.

Manlius Township: W. D. Gannett and Ford Oil Co. 1 Oetman, SE NW NE 6-3n-15w, Traverse 1,484 ft., dry, TD 1,490 ft.

Kalamazoo County, Comstock Township: Arthur J. Gilmore 1 Nazareth College, SW SW NW 9-2s-10w, Traverse 1,355 ft., dry, TD 1,388 ft.

SOUTH LOUISIANA

Offshore Oil Strike For Magnolia

NEW ORLEANS.—Approximately 25 miles off the St. Mary Parish coastline, Magnolia Petroleum Co. has run a successful drill-stem test on the State Lease 693, Block 125, Eugene Island area. On a 2-hour test through perforations at 11,656-58 ft., the well flowed 372 bbl. of 32.3° gravity oil daily through a 1/4-in. choke. Operators changed chokes several times and the pressure remained constant at 2,600 psi. It is reported that more sections in the well will be tested, but operators indicated that the well will be completed in the zone where the successful test was made. This well pushes the boundaries of production to their farthest point in the Gulf of Mexico.

Meanwhile, off Iberia Parish, the same operator is preparing to test perforations at 10,728-38 ft. in the C-1 State Lease 685, Block 95. The well is approximately one-half mile from the Block 110 test, which was completed as a gasser some time ago. The Block 95 well had three good gas sands.

The California Co. is preparing to complete its confirmation test to the Roemer's Pass discovery, the 2 North Main Pass 22-20s-19e. The well, which has a 131-ft. net gas sand and 40-ft. oil sand, has total depth of 10,250 ft.

Earl Bateman and Louis Roussel are drilling below 9,000 ft. in the 1 Doescher field wildcat in Jefferson Parish, 39-13s-10e. The well tested at 8,000 ft. and again at 8,200 ft. where cores were taken. Cores revealed an oil odor and slight taste. The taste is reported to have favored gas more than oil. Operators will continue to drill down, since it is believed that the well is running 75 ft. high structurally.

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SOUTH LOUISIANA WILDCAT FAILURES

Jeff Davis Parish: Continental Oil Co. 1 A. G. Fontenot, 35-9s-5w, ¾ mi. S of Welsh Dome, dry, TD 12,005 ft.

Rapides Parish: Justiss-Mears Oil Co. 1 O'Neal Estate, Catahoula Lake area, 10-5n-3e, dry, TD 5,358 ft.

ILL.-IND.-KY.

Western Kentucky Wildcat Shows for Good Discovery

A PARTICULARLY promising discovery for Western Kentucky appears to have been made by Joe Reznick and C. P. Chandler at their 1 Trigg, SW NE NE 1-P-21, western Henderson County, where 810 ft. of clean oil was recovered in a drill-stem test of McClosky lime found at 2,586-90 ft. This wildcat is 2 miles south of the town of Smith Mills and about 3 miles to the east of the pool of the same name which has proved one of the most prolific producing areas of the state.

In the drill-stem test, gas showed at the surface within 11 minutes after the tester was opened. Indicated bottom-hole pressure was 950 psi. There was no trace of water. Oil string has been run to 2,580 ft. for completion. The well ran about 52 ft. higher than a dry hole which was drilled about 1¼ mile north.

J. F. Balderson and Paul Waterbury 1 Mundy, NW NE SW 33-1n-13w, which opens a new producing area about 6 miles northwest of Mt. Carmel, Wabash County, Illinois, swabbed at the rate of 10 bbl. of oil per hour while cleaning out following a 6,000-gal. acid treatment to test O'Hara lime at 2,657-61 ft. It is about a mile west of production in the South Friendsville pool.

Another discovery well in Illinois, The Texas Co. 1 Harrell, NE NW NE 34-4n-5e, 6 miles south of Iola, Clay County, also is being tested. It swabbed at the rate of 13 bbl. of oil natural before being shut in for additional tankage. Its production is for Benoist sand at 2,581-2,604 ft. It is the second discovery made by the same company in that area within the last several weeks. The first discovery well, 1 Galbert, is about ¾ mile to the east. It also is producing from Benoist sand.

Indiana also has a prospective new discovery well at Don McCumber 1 Alexander, in 42-3n-11w, several miles southwest of Vincennes, extreme western Knox County. In a drill-stem test of O'Hara lime at 1,870-86 ft., it showed considerable gas and yielded 350 ft. of free oil with about 100 ft. of water. Casing has been run to the top of the pay zone for testing. Nearest production is in the East St. Francisville pool, on the Illinois-Indiana state line, several miles to the southwest.

R. E. Bauer and H. Atha 1 Posey County Poor Farm, NW SE SE 6-7s-13w, ¼ mile southwest of production of the Refinery pool at the northwest edge of Mt. Vernon, Posey County, Indiana, is being put on the pump with production estimated at 50 bbl. of oil daily. Production is from Tar Springs sand, one of the 3 known pay zones of the pool. Pay in this well is at 2,280-91 ft.

ILLINOIS WILDCAT FAILURES

Franklin County: J. L. Crawford 1 Donahoo, SW SW SW 31-5s-8e, dry, TD 3,387 ft.
W. I. Lewis 1-H Cross, NW NW SE 31-5s-8e, dry, TD 2,462 ft.

Gallatin County: Ashland Oil & Refining Co. 1 Hale, SE SE NE 26-7s-9e, dry, TD 3,102 ft.

Greene County: B. W. Quick 1 Meng, SE SE NW 9-10n-10w, dry, TD 903 ft.

Macon County: P. Doran 1 Griswald, NW NW SW 3-14n-1e, dry, TD 2,342 ft.

Perry County: W. O. Schock 1 Glenn, SW SW NE 9-4s-3w, dry, TD 2,850 ft.

Richland County: W. H. Bears 1 Knakmuhs, NW SE SW 27-2n-10e, dry, TD 3,258 ft.
F. A. Noah & Sons 1 Stover, NW SW NW 29-2n-10e, dry, TD 3,315 ft.

Calvert Drilling Co. 1 McLean, SE SE SW 30-3n-14w, dry, TD 3,309 ft.

Saline County: W. C. McBride, Inc., 1 Beagle, SW NW NE 13-9s-7e, dry, TD 2,125 ft.

INDIANA WILDCAT FAILURES

Daviess County: Ernest Zink 1 Zigler, NE NE SE 2-4n-5w, dry, TD 940 ft.

Gibson County: R. T. McDermott 1 Schleter, SW NW NW 36-2s-10w, dry, TD 1,985 ft.

Knox County: C. E. Skiles 1 Watson, NE NW SW 21-1n-11w, dry, TD 2,180 ft.

Owen County: W. C. Burrage 1 Everhart, NW NE SW 22-9n-5w, dry, TD 1,450 ft.

Spencer County: W. E. Payton 1 Shrode, SE SE SE 36-6s-6w, dry, TD 1,336 ft.

Vanderburgh County: Joe Reznik 1 Barnes, SW NE SE 35-5s-11w, dry, TD 2,515 ft.

Vermillion County: H. M. Kine 1 Mace, NE NW SW 30-16n-9w, dry, TD 1,456 ft.

Vigo County: F. B. Cline 1 Crews, SE NE SE 28-12n-10w, dry, TD 1,930 ft.
F. B. Cline 1 McGlone, NW SW SE 33-10n-9w, dry, TD 2,363 ft.

WESTERN KENTUCKY WILDCAT FAILURES

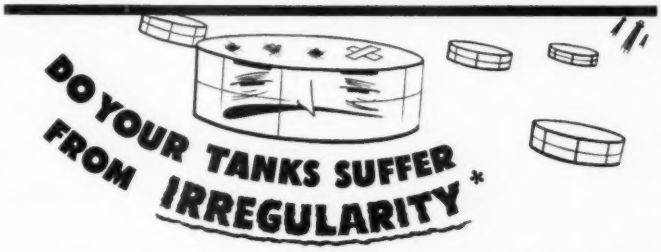
Daviess County: Ellis-Morrison-Dameron 1 20th Century, 20-O-27, dry, TD 2,184 ft.

Henderson County: W. F. Lacy 1 Crooks, 24-O-22, dry, TD 2,712 ft.

EASTERN KENTUCKY

ASHLAND.—In Wolfe County, on the east end of production in the Pilot East pool, Dave Ledford 17 J. B. White Heirs on Whites Branch was good for 10 bbl. daily from Corniferous lime at 1,030 to 1,120 ft., total depth, and Charles Ledford 11 Ledford, White & Tidwell has been finaled as a dry hole at 1,130 ft. after topping Corniferous lime at 1,035 ft.

In Breathitt County, in SE SE Salyersville Quadrangle, United Carbon Co. is drilling below 1,500 ft. in a third test on



due to lack of LIQUID PLASTIC in your painting program?

*IRREGULARITY — the "touch up" cleaning and painting of low areas on decks of tanks where corrosion has set in before it is time to repaint the entire tank.

If so, then switch to the LIQUID PLASTIC plan for regularity in maintenance painting.

If "touch up time" is near—then call a "Liquid Plastic" Engineer. Areas where corrosion has started may be spot cleaned and treated with *Wash Primer*. Then "Liquid Plastic" coatings may be applied over entire surface area of deck. Yes—that's right—it may be applied over *old paint* where condition of old paint is not peeling or chipping.

Write, wire or phone.

LIQUID PLASTIC VINYLITE Protective Coating

PLASTIC COATING CORP.
P. O. Box 13127 HOUSTON 19, TEXAS
30 Rockefeller Plaza, New York 20, N. Y.
640 North Broad Ave., Wilmington, Cal.

E. J. Evans fee along Hawes Fork. It is one location north of same company's No. 2, which made a small well in the Weir (Mississippian) sand. Another location has been made 660 ft. east of the discovery well, which also was completed for a small Weir producer after finding the Big Six sand dry.

OHIO FIELDS

Muskingum County Well Has Promising Shows

COLUMBUS.—Frank Brendel Oil & Gas Co. 2 Jared Ashcraft, Lot 13, Section 7, Jackson Township, Muskingum County, ¼ mile north of the Rolla Fairall, looks promising. The Clinton, topped at 3,187 ft., is drilling in with good oil showings, and oil showings in this area respond well to shooting.

Two wells were completed in Harrison Township, Perry County. National Gas Co. 2 Asa Nelson, Section 16, found the Clinton at 3,452-87 ft. which was shot with 120 qt. and made 40 bbl. in the first 24-hour test. To the south along the township line, R. B. Weed 1 Grover Browning found the sand at 3,615-63 ft. which made 35 bbl. in the first 24 hours after a 120-qt. shot.

The Mid East Oil Co. 2 C. L. Eppley, Section 33, Hopewell Township, Perry County, missed the oil pay but picked up 250,000 cu. ft. of gas in the Clinton at 2,921-47 ft. When shutin after shot, the gage had increased to 500,000 cu. ft.

Along the north edge of Hemlock Grove pool in Bedford Township, Meigs County, Preston Oil Co. 7 Wilson made 4 bbl. and 100,000 cu. ft. of gas natural, and 27 bbl. and 300,000 cu. ft. of gas in 24 hours after shot.

CANADIAN FIELDS

Craigmyle Test Is Unproductive

CALGARY.—Bailey-Craigmyle 1, LSD 1, 19-32-16w4, key wildcat in the Craigmyle area, about 90 miles northeast of Calgary, found the Madison limestone tight and unproductive. Last week the interesting test topped the Madison at 4,064 ft., logging about 40 ft. higher than the Socony-Vacuum test 2½ miles to the north that had given oil encouragement on drill-stem test last year. The looked-for porosity at the Bailey well failed to show at total depth of 4,200 ft., and the well was electrologged and declared dry.

National Petroleum Corp. of Calgary has high hopes for the encouragement shown in its Madison-indicated discovery well at Spring Coulee, in southern Alberta, about 18 miles north of the United States border. National-Spring Coulee-Malmberg 1, LSD 14, 36-3-23w4, started on preliminary production tests following partial acidizing of a 20-ft. Madison section from 5,880-99 ft. This zone is due for further treatment, as is another 20-ft. section at 5,903-23 ft.

The well was kicked off by swabbing March 27. For several days it flowed by heads, cleaning out acid water, and winding up with fairly clean recovery of light, green crude oil rating 38°-40° gravity. Output rate during flow periods was reported by officials of the corporation at about 10 bbl. hourly. Except for filling of a 250-bbl. tank, the only one presently at the well, output has been flared.

While the well looks encouraging, it is not possible to evaluate it on the basis of the brief tests made so far. The well is currently blocked off by heavy mud, which has made the trail into the site impassable. This has delayed delivery of tankage and equipment to permit completion of acidizing, and testing of oil potential.

Imperial Oil, Ltd., has commenced drilling operations at its seventh venture in the Golden Spike area. To date Imperial has drilled three oil wells and three step-out failures in that area. The new test, Imperial-Golden Spike 9, LSD 9, 27-51-27w4, is located ½ mile north of No. 5 producer.

Eleven wells were completed in Alberta during the past week, boosting total completions for the 97-day period (January 1 to April 7) to 175. This week brought 7 oil wells and 4 failures, making the year's total so far 116 oil, 5 gas discoveries, and 54 dry holes. The prolific Redwater field accounted for six of the new producers, four drilled by Imperial Oil, Ltd., and two by the Pacific Group. The Home-Anglo-C. & E. team placed its twentieth Woodbend well on production, while Mutual Holdings, Ltd., failed to find production at its initial venture in the Leduc area. Three exploratory ventures were completed as failures.

ALBERTA UNSUCCESSFUL WILDCATS

Bailey-Craigmyle 1, LSD 1, 19-32-16w4, TD 4,200 ft.

Imperial-Hairy Hill 1, LSD 14, 14-56-13w4, TD 3,905 ft.

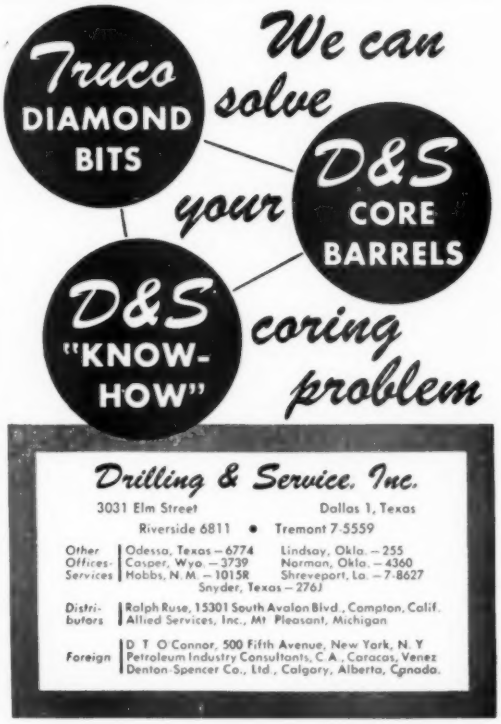
Gulf T. Z. Brodie 14, LSD 14, 11-40-20w4, TD 6,068 ft.

Gaushell Named Manager

Continental Supply Co. has announced the appointment of F. W. Gaushell as manager of the Alice, Tex., store.

THE OIL AND GAS JOURNAL

"Yeah, his face is familiar—suppose he's some new guy they sent here to check on this offshore drillin'?"



SENSATIONAL New Threading Attachment for LEHMANN LATHES!

PATENT APPLIED FOR

Tool Joint 4¾" Diameter, 5 Pitch Thread 4" Long

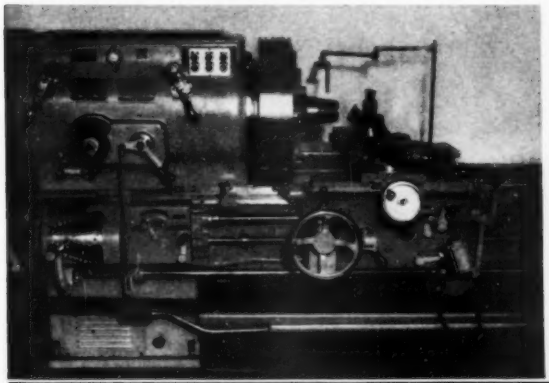
Blindfolded, Inexperienced Operator Threads 4" Oil Field Tool Joint to A.P.I. Standards, *in 15 minutes!*...

Yes, this amazing new Threading Attachment for LEHMANN LATHES will definitely reduce your threading time. It will disengage and stop tool at the same place, no matter what the speed, and close to a shoulder without thread relief and with perfect safety.

The LEHMANN Threading Attachment automatically and simultaneously disengages half nuts, and backs out tool on contact with automatic stop. It can be set for external or internal threads, for right hand or left hand threads, and for straight or tapered threads. In short, it enables an inexperienced operator to equal the speed of an expert.

Write Today for Prices and Full Description

• • •



25-inch HYDRATROL Oil Field Lathe with LEHMANN Threading Attachment.

CHOUTEAU AT GRAND • ST. LOUIS 3, MO.

LEHMANN MACHINE COMPANY

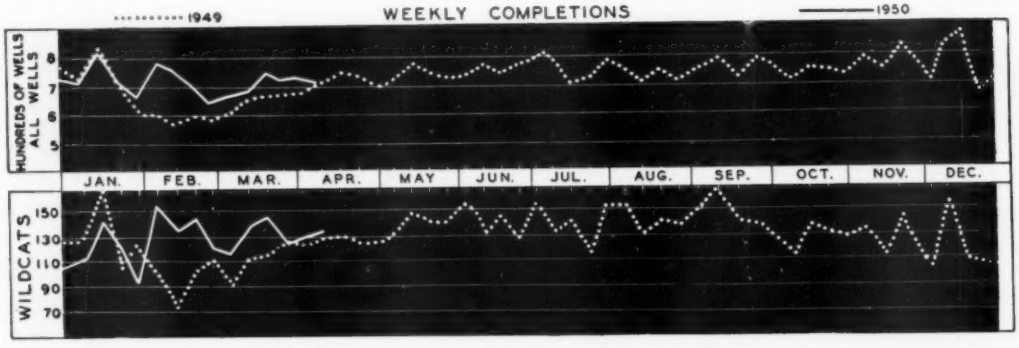
CURRENT STATISTICS

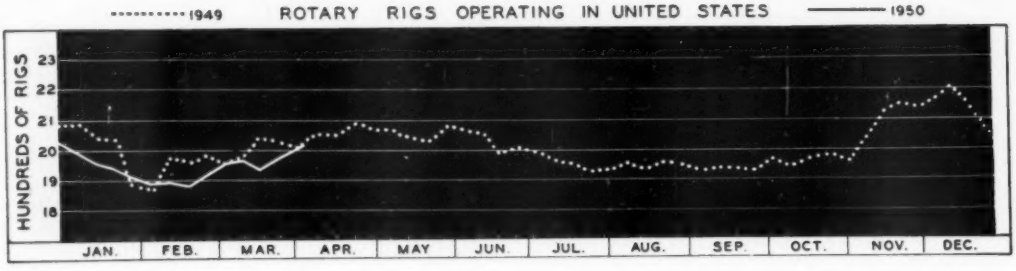
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . WEEK ENDED APRIL 8, 1950

	Total of all wells					Apr. 8		Wildcat completions and discoveries									
													Cumulative total, 1950				
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	10	5	0	*5	14,706	131	371	0	0	0	0	0	0	0	0	0	0
Pennsylvania	22	7	8	†7	34,077	298	613	0	0	0	0	0	0	0	0	0	0
West Virginia	9	2	4	3	23,351	159	141	0	0	1	0	1	0	0	4	6	10
Ohio	19	6	6	‡7	40,261	242	303	0	0	0	0	0	1	0	1	5	7
Indiana	14	4	0	10	25,939	275	281	0	0	0	9	9	9	0	1	44	54
Kentucky	16	6	0	10	24,879	212	217	0	0	0	2	2	4	0	1	16	21
Illinois	35	11	0	24	81,649	579	542	0	0	0	10	10	9	0	0	135	144
Michigan	8	4	0	4	15,994	168	223	0	0	0	3	3	8	0	1	70	79
Kansas	64	39	6	‡19	204,580	915	744	3	0	1	4	8	21	0	2	125	148
Nebraska	0	0	0	0	0	18	2	0	0	0	0	0	0	0	1	10	11
Oklahoma	124	73	4	§47	428,392	1,320	988	1	0	1	19	21	41	3	6	168	218
Texas	270	177	10	83	1,069,990	3,969	3,372	13	0	3	46	62	120	10	37	642	809
North Central (Dist. 7-B & 9)	102	56	2	44	323,962	1,242	1,076	1	0	2	22	25	42	2	11	227	282
West (Dist. 7-C & 8)	64	55	0	9	297,986	1,145	735	2	0	0	9	11	29	1	0	141	171
Panhandle (Dist. 10)	17	10	4	3	47,534	280	251	0	0	0	0	0	1	0	2	7	10
Eastern (Dist. 5, 6, & 6-P)	18	9	2	7	53,853	272	263	0	0	0	4	4	3	1	1	70	75
Gulf Coast (Dist. 2 & 3)	36	24	1	11	203,691	536	479	4	0	0	4	8	20	3	11	79	113
Southwest (Dist. 1 & 4)	33	23	1	9	142,964	494	568	6	0	1	7	14	25	3	12	118	158
Louisiana	50	29	5	16	257,265	614	526	0	0	0	4	4	19	5	4	49	77
Northern	33	21	4	‡8	102,894	317	269	0	0	0	2	2	3	0	1	24	28
Southern	17	8	1	8	154,371	297	257	0	0	0	2	2	16	5	3	25	49
Arkansas	7	4	0	3	30,485	92	61	0	0	0	1	1	1	0	0	23	24
Mississippi	10	3	0	7	75,704	82	93	0	0	0	4	4	2	1	0	28	31
Southeastern States	3	0	0	3	13,332	18	14	0	0	0	2	2	0	0	1	12	13
Montana	0	0	0	0	0	29	49	0	0	0	0	0	0	0	0	8	8
Wyoming	6	3	0	3	31,218	147	140	0	0	0	1	1	3	0	0	21	24
Colorado-Utah	0	0	0	0	0	16	37	0	0	0	0	0	0	0	0	13	13
New Mexico	12	9	1	2	66,350	175	142	0	0	0	1	1	6	0	0	16	22
California	39	33	1	5	184,435	464	690	2	0	0	5	7	8	0	2	87	97
Miscellaneous	0	0	0	0	0	3	13	0	0	0	0	0	0	0	0	3	3
Total United States	718	415	45	258	2,622,607	9,926	9,558	19	0	6	111	136	252	19	61	1,481	1,813
Total previous week	732	436	46	250	2,789,496			20	1	3	107	131	233	19	55	1,370	1,677
Total April 9, 1949	769	415	72	282	2,835,703			20	3	5	100	128	231	20	47	1,344	1,642

Service wells included: *5, †7, ‡1, §3.





DAILY AVERAGE PRODUCTION FOR WEEK

	April 8 crude oil	B. of M. April demand	April 1 crude oil
Alabama	1,250	1,000	1,350
Arkansas	80,900	83,000	80,800
California	859,100	842,000	860,700
Colorado	58,400	66,000	60,200
Eastern	61,000	60,900	58,850
Florida	1,025	900	850
Illinois	183,900	182,000	180,800
Indiana	29,200	27,000	28,000
Kansas	256,950	280,000	266,400
Kentucky	26,100	25,000	25,200
Louisiana	511,500	548,000	507,700
North Louisiana	116,500		116,300
South Louisiana	395,000		391,400
Michigan	44,400	45,000	45,600
Mississippi	93,650	99,000	98,850
Montana	22,500	25,000	23,100
Nebraska	1,450	1,100	1,450
New Mexico	125,800	132,000	128,875
Oklahoma	440,150	415,000	421,600
Texas	1,982,850	2,060,000	1,859,075
Dist. 1 (Southwest)	26,475		25,950
Dist. 2 (Southwest)	118,900		114,225
Dist. 4 (Southwest)	187,700		182,500
Dist. 3 (Gulf Coast)	348,300		316,150
Dist. 5 (Eastern)	30,550		23,875
Dist. 6 (Eastern)	80,250		77,400
East Texas field	258,000		250,450
Dist. 7-C (West)	47,875		44,975
Dist. 8 (West)	601,850		541,800
Dist. 7-B (W. Central)	63,100		62,425
Dist. 9 (N. Central)	130,550		130,075
Dist. 10 (Panhandle)	89,300		89,250
Utah	3,100	1,100	2,900
Wyoming	149,200	136,000	157,000
Total United States	*4,932,425	5,030,000	4,809,300
Change from previous week, up	123,125		
Canada	67,170		77,135

Total U. S. production January 1-April 8 ..... †484,175,335 bbl.
Same period last year (crude plus cond.) ..... 524,592,985 bbl.

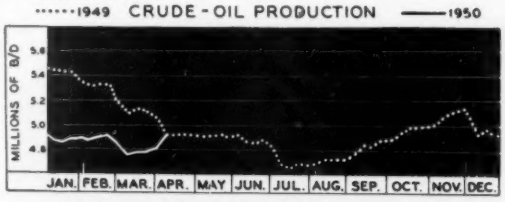
*Not including 96,980 bbl. condensate. †Including 9,090,165 bbl. condensate.

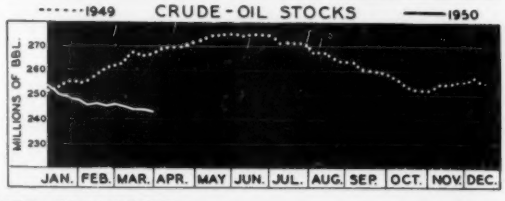
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

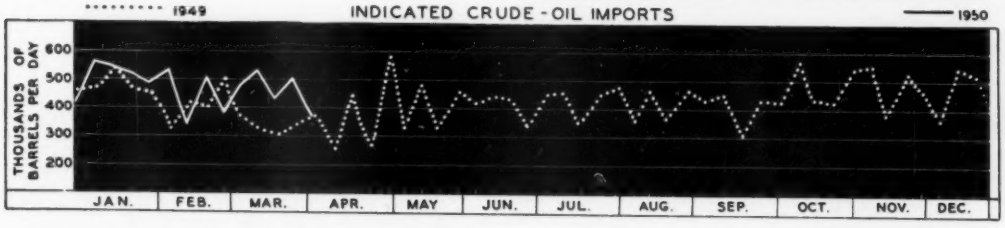
(Thousands of barrels)

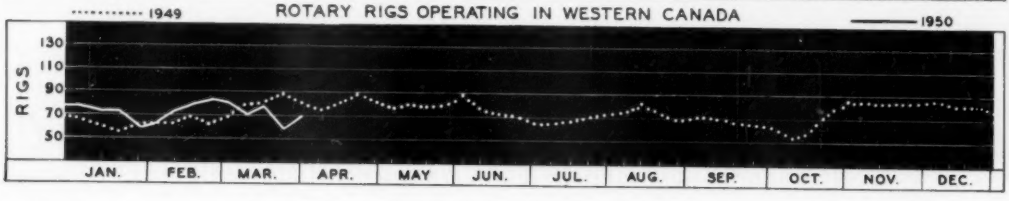
	Apr. 1, 1950	Mar. 25, 1950	Apr. 2, 1949
Pennsylvania Grade	2,804	2,738	3,000
Other Appalachian	1,591	1,582	1,670
Illinois, Indiana, Michigan	10,205	10,468	15,293
Arkansas	3,368	3,281	3,281
Louisiana	15,992	16,060	13,689
North	3,454	3,427	3,459
Gulf	12,538	12,633	10,230
Mississippi	2,566	2,594	2,892
New Mexico	6,628	6,805	7,233
Oklahoma and Kansas	35,310	35,408	37,654
Texas	107,016	106,687	128,876
East Texas	14,598	14,339	17,897
West Texas	37,876	37,645	52,200
Texas Gulf	28,219	28,311	30,058
Other Texas	26,323	26,392	28,721
Rocky Mountain	13,308	13,429	13,098
California	38,245	38,162	33,311
Foreign	6,074	7,013	7,792
Total	243,107	244,227	267,789

*Bureau of Mines.







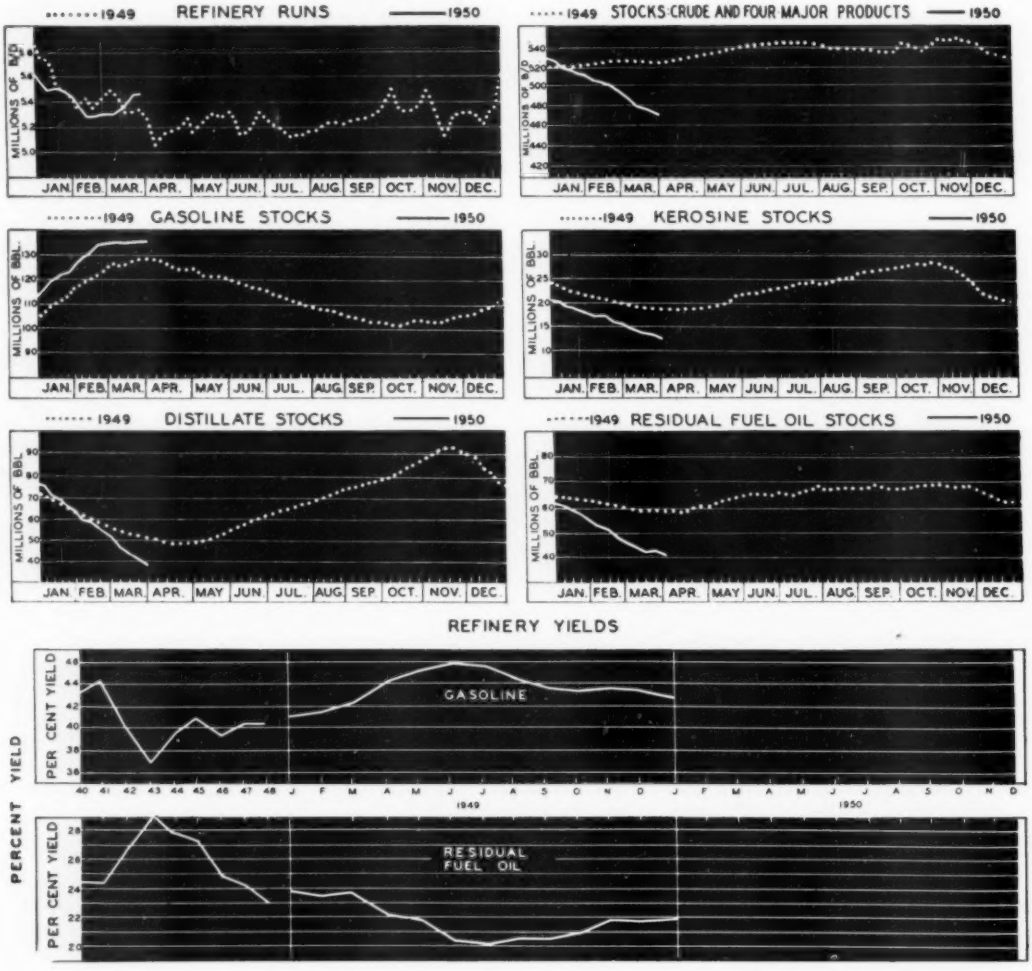


A.P.I. REFINERY REPORT, APRIL 1

(Thousands of barrels)

District—	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, March 1949				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production			
											Gasoline*	Kerosine	Distillate	Residual
East Coast	828	331.3	38.3	196.4	198.3	26,814	4,852	10,620	8,881	768	305.4	27.8	164.6	210.3
Appalachian:														
District 1	92	36.6	7.7	10.9	11.4	2,672	250	386	210	83	40.9	5.0	10.1	11.6
District 2	77	38.1	5.7	9.0	21.0	1,055	78	127	141	65	32.9	3.3	6.0	15.1
Ind., Ill., Ky.	1,050	542.3	58.3	178.9	164.1	28,908	1,916	4,569	2,141	886	469.0	57.9	125.1	155.6
Okla., Kans., Mo.	437	240.1	18.9	89.7	49.6	14,779	394	2,484	621	422	218.1	22.6	85.7	73.2
Inland Texas	187	132.1	9.9	23.1	42.6	3,645	212	713	562	220	137.1	13.7	20.5	53.3
Texas Gulf Coast	1,274	614.8	105.3	219.0	238.4	21,378	2,060	6,071	3,268	1,291	601.9	84.1	233.6	236.3
La. Gulf Coast	454	227.3	56.1	98.4	53.4	7,078	1,417	2,808	1,945	433	195.9	47.5	91.3	57.5
N. La. and Ark.	59	23.6	4.1	7.3	12.7	3,523	154	428	166	75	27.8	7.9	11.2	16.9
Rocky Mountain:														
New Mexico	12	7.3	.4	2.0	2.9	82	25	73	31	11	6.4	.4	1.5	3.0
Other Rocky Mtn.	156	70.7	5.9	26.6	33.7	5,304	285	1,229	429	165	71.3	5.4	30.5	38.8
California	844	368.9	18.1	167.4	303.6	20,348	782	9,024	22,626	933	363.0	13.9	152.6	386.3
April 1, 1950	5,470	2,633.1	328.7	1928.7	1,131.7	135,586	12,425	38,532	41,041	5,352	2,469.7	289.5	932.7	1,257.9
March 25, 1950	5,469	2,548.4	334.0	981.4	1,167.3	135,406	12,950	40,086	42,546					
April 2, 1949	5,269	2,519.3	279.9	951.1	1,193.0	127,769	17,915	48,556	56,120					

*At refineries including natural blended. †Finished and unfinished. ‡Reflects revisions in California for all of March.


1949
REFINERY RUNS
1950
MILLIONS OF B/D
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.
1949
STOCKS CRUDE AND FOUR MAJOR PRODUCTS
1950
MILLIONS OF B/D
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.
1949
GASOLINE STOCKS
1950
MILLIONS OF BBL.
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.
1949
KEROSINE STOCKS
1950
MILLIONS OF BBL.
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.
1949
DISTILLATE STOCKS
1950
MILLIONS OF BBL.
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.
1949
RESIDUAL FUEL OIL STOCKS
1950
MILLIONS OF BBL.
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

CRUDE PRICES
GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Tex *	West Tex.†
18-18.9	$1.53			
19-19.9	1.63			
20-20.9	1.73	$2.25		$2.12
21-21.9	1.82	2.27		2.14
22-22.9	1.92	2.29		2.16
23-23.9	2.02	2.31		2.18
24-24.9	2.12	2.33	$2.56	2.20
25-25.9	2.22	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.54
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

GASOLINE demand continues with near-normal seasonal increases, but some suppliers feel that refinery output is greater than it should be for this time of the year. Gasoline production for the week ended April 1 averaged 2,633,000 bbl. daily compared with 2,601,000 bbl. daily for June, July, and August of last year.

Gasoline stocks at the end of March last year were considered high and were still above normal at the end of May. When demand for fuels dropped because of the lack of fillup purchases by consumers and resellers, the increase in gasoline yields kept gasoline inventories at a high level despite reduced refinery runs.

Heavy reductions in gasoline stocks from now until the first of June will permit more flexible refinery operations during the summer months. If the expected midsummer gasoline demands materialize and if fuel consumers and resellers return to the program of buying for storage during the summer months, refinery runs can be increased. On the other hand, if clean-product inventories are high at the beginning of gasoline season and fuel resellers stay out of the market again, the situation could produce another weak distillate market.

Prices for 26-70 natural gasoline increased .25 cent a gallon, bringing Group 3 quotations to 4.25 cents. Current reports indicate that the market is firm at the new prices.

Activity in all gasoline markets is increasing with still more attention given to the octane rating of the product. Open-market trading in heating fuels has been light as the season ends, but prices have remained generally firm because of low inventories. Esso Standard Oil Co. raised Gulf-East Coast heavy fuel prices $0.15 a barrel effective April 11.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of April 10, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 74-76 octane	9⅜-9¾	10.375-10.6	9¼-9¾
Premium gasoline, 78-80 octane	10¼-10¾	11.5-11.6	9¾-10¾
42-44 w.w. kerosine	8½-8⅝	9.8	8-8½
No. 2 straw fuel oil	7⅝-7¾	7.6	6⅝-7
No. 6 residual	$1.50-1.60	$1.90-2.05	$1.50-1.65

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	4¼	3¾	4
Grade 18-55	5.1	4.6	4.85

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	10.5
750 vis., No. 3-4 neutral	12.75
2,000 No. 5-6 neutral	14-14.5

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	17
200 vis., No. 3 neutral, 0-10 pp.	11.5-12.5

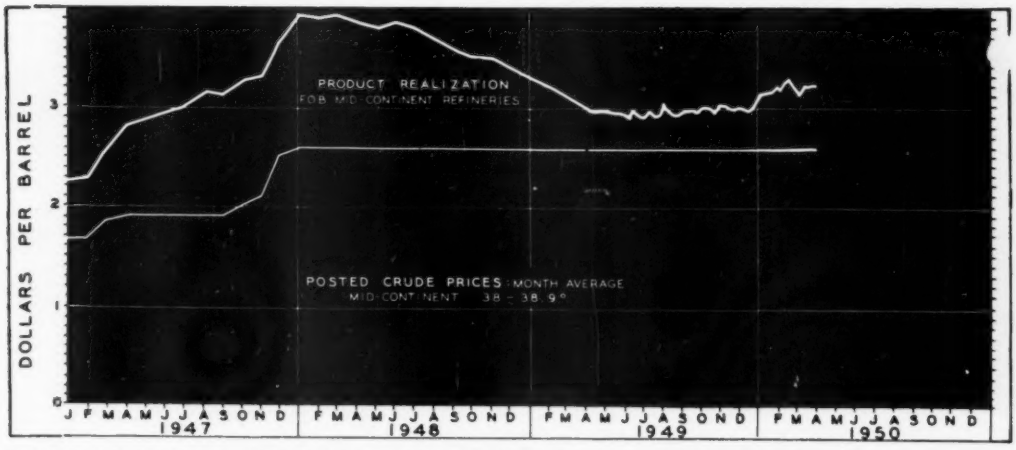
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	19.5-20.5
180 vis., 0 p.t. neutral	20.5-21.5

WAX

Mid-Continent

132-134 A.M.P.	4.25


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
0
1
2
3
J F M A M J J A S O N D
1947
J F M A M J J A S O N D
1948
J F M A M J J A S O N D
1949
J F M A M J J A S O N D
1950

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil

EQUIPMENT MEN . . . in the News

Tube-Kote Announces Sales Organization Changes

G. O. CARROLL

G. O. Carroll, sales manager of Tube-Kote, Inc., Houston, applicators of thermosetting, baked-on, plastic coatings for the oil and chemical industries, has announced the establishment of new sales and service territories.

G. L. GARNER

F. KOHLHAUSEN

The Shreveport area will be served by G. L. Garner; Kansas and Louisiana by Fritz Kohlhausen; San Antonio and South Texas by Len Edgar, and the middle Louisiana area by Bob Dwyer.

LEN EDGAR

BOB DWYER

Armour Research to Conduct Symposium on Spectroscopy

A symposium dealing with the application of spectroscopy in the petroleum industry will be held May 16, 1950, at Armour Research Foundation of Illinois Institute of Technology under the sponsorship of the Chicago Chapter of the American Association of Spectrographers.

Announcement of the symposium was made by the program chairman, Arthur J. Mitteldorf, associate physicist at the Research Foundation, and Frank W. Porsche, spectrographer for Standard Oil Co.(Ind.). Use of the spectroscopic equipment for making highly accurate analyses of substances through the use of light will be discussed at afternoon and evening sessions.

Both absorption and emission phases will be discussed. Technical papers on large-scale production control, laboratory research, and theoretical investigations are planned. Major oil companies and manufacturers of spectroscopic equipment will participate to help survey applications of spectroscopy in the petroleum industry.

Stevenson Is General Sales Manager, Tractor Division

R. S. STEVENSON

Appointment of R. S. Stevenson as general sales manager of Allis-Chalmers Tractor Division has been announced by W. A. Roberts, executive vice president of the company. He succeeds Marshall L. Noel who recently resigned.

Stevenson has been associated with Allis-Chalmers since 1933 when he joined the Kansas City branch as a salesman. Two years later he became assistant manager of the company's branch at Omaha.

In 1936 he was transferred to the Milwaukee home office as assistant Southwest territory manager, and later that year was appointed manager of the Northwest territory. In 1941 he was appointed Southwest territory manager, remaining in that position until the fall of 1948 when he became assistant general sales manager.

Camco Names Regan Forge As California Sales Agent

Regan Forge & Engineering Co., San Pedro, Calif., has been named sales agent in California for Camco gas lift valves, Paul Mills, chairman of the board of Camco, Inc., has announced.

Regan will handle service and installation as well as sales. Camco's service to the oil industry includes United States, and Canada, as well as sales representation in South America.

Reed, Haltom Promoted By Dallas Tank Co.

W. W. Banks, president of Dallas Tank Co., has announced that Malcolm V. Reed has been appointed executive vice president, and that E. O. Haltom has been appointed sales manager.

M. V. REED

E. O. HALTOM

Reed and Haltom had been closely associated at Southern Methodist University as well as at other times during the past 16 years. These recent appointments, consequently, are in the nature of a reunion. Haltom and Reed have a wide experience and background in plate fabrication and sales in the oil industry.

Sease to Represent Globe Oil Tool in Dallas Area

W. S. SEASE

Charles E. Whittaker, general manager, Globe Oil Tools Co., Los Nietos, Calif., recently announced that W. S. Sease will serve as Globe representative in Dallas and will handle the complete line of Globe rock bits, junk catcher, hole openers, and side-hole cutters.

Sease graduated from Yale University in 1928, where he received a degree in engineering. He has been associated with the oil-equipment business for more than 10 years.

Hall's Spiral Centralizer Patents Upheld by Court

A decision was handed down March 20 by the United States Fifth Circuit Court of Appeals upholding the patents granted to J. E. Hall, founder of Weatherford Oil Tool Co., Inc., on the spiral centralizer. The suit was instituted by Hall against B & W, Inc.

Garner Elected President Of Oil Exploration, Inc.

The board of directors of Oil Exploration, Inc., recently elected Jay P. Garner as president. Garner is a 1935 graduate of Rice Institute. On graduation he was employed by The Texas Co. geophysical department, with whom he worked through 1945.

He assisted in organizing Oil Exploration, Inc., in January 1946. Oil Exploration is a geophysical company specializing in seismic surveys.

Mills Becomes Foster Wheeler Board Chairman

E. W. MILLS

Earle W. Mills, president of Foster Wheeler Corp., New York, has been elected chairman of the board. Mills joined Foster Wheeler early last year on his retirement from the Navy as chief of the Bureau of Ships and was elected president about 6 weeks ago following the death of Harry S. Brown.

Dave McCulloch, with Foster Wheeler and its predecessors since 1906 and former board chairman, expressed the desire to retire from active service and was elected vice chairman of the board.

Geoffrey H. Hopewell, managing director of Foster Wheeler, Ltd., a British subsidiary, was elected vice president. George MacNoe, president of Foster Wheeler, Ltd. (Canada), was elected a director.

International Harvester to Build Dallas Parts Depot

International Harvester Co. has announced the letting of all but one major contract for the construction of a service-parts depot, costing approximately $1,500,000, located in Dallas.

The announcement was made jointly by E. H. Watkins and J. H. Matthews, International Harvester motor-truck and general sales district managers in Dallas. The announcement said that construction work on the new building will start immediately.

The Dallas parts depot will be the seventh of a chain of 12 depots to be operated by International Harvester throughout the United States. It will contain approximately 200,000 sq. ft. of floor space and will store and ship service parts for all of the company's motor-truck, farm equipment, and industrial power.

The depot will serve Harvester dealers and company operations located throughout the states of Texas, western Louisiana, and parts of Oklahoma, and New Mexico. It will employ about 300 people when in full operation.

Halliburton Nears Completion of New Cement Plant

This modern new cement plant being constructed by Halliburton Portland Cement Co. at Corpus Christi initiates a new technique in cement production.

Deliveries of Shell brand Portland cement are now being made from a new plant constructed by Halliburton Portland Cement Co. The plant is of the wet-process type, employing closed circuit grinding systems for both raw and finished grinding. Since this is the first use of the wet-process closed-circuit system, employing rake and bowl classifiers, by the cement industry in grinding of oyster shells, considerable research on this method was carried on.

Officers and key personnel of the firm are: Erle P. Halliburton, president; Erle P. Halliburton, Jr., vice president; Ellroy King, vice president and secretary-treasurer; R. A. Beaver, assistant secretary-treasurer; A. J. Anderson, works manager; Everett E. Knott, sales manager; and Carl M. Price, consulting chemical engineer.

Regular products of Halliburton Portland Cement will be regular Portland cement, High Early Strength Portland cement, High Temp Oil Well cement, and Masonry cement.

Rockwell Names Barnett To Tulsa Sales Post

O. W. BARNETT

M. D. Gilbert, district manager of the Tulsa area for Rockwell Manufacturing Co., has announced appointment of Orville W. Barnett as gas-products sales supervisor in the Tulsa district.

Barnett was employed by Rockwell immediately following his graduation from Oklahoma University in 1934, where he majored in engineering. He was first assigned to Nordstrom field work in Oklahoma, then to the Rodessa and Shreveport, La., areas, and more recently has headquartered in Dallas. He will continue to maintain his headquarters in Dallas.

American Machine & Metals Buys Gotham Instrument Co.

American Machine & Metals, Inc., has announced the establishment of a new division through the acquisition of Gotham Instrument Co., Inc., of New York.

This will supplement the line of pressure, temperature, electrical, flow, and liquid-level indicating instruments made by the United States Gauge division, by the addition of a complete line of industrial recording and controlling instruments made by the Gotham Instruments Division.

Stubble Named District Manager by National Supply

C. J. Stubble, since 1937 manager of National Supply Co.'s store at Bolivar, N. Y., has been named district manager of the New York and Pennsylvania districts, according to an announcement by William Van Fleet, eastern division manager.

Stubble, who first joined National in 1934, will have supervision over National Supply stores at Bolivar, and at Bradford, Butler, Titusville, and Waynesburg, Pa.

National Supply has also opened a new store at Plainville, Kans. C. E. Peery, store manager of the Plainville unit, was formerly located at the Russell, Kans., store. Leon V.

George, also from the Russell store, is now located at Plainville.

J. C. Love is field sales representative at Plainville and the entire operation is under the supervision of C. S. Miller, National's assistant district manager at Great Bend, Kans.

Fairbanks-Morse Elects R. H. Morse, Jr., President

R. H. MORSE, JR.

Robert H. Morse, Jr., who started with Fairbanks, Morse & Co. in 1916 in the foundry of the Beloit, Wis., plant, was elected to the presidency by the directors, following the annual meeting of stockholders.

Morse has been vice president in charge of operations. Previously he was vice president in charge of sales, assistant general sales manager, and has held many other positions. His father, Robert H. Morse, whom he succeeded, becomes chairman of the board.

Morse, Sr., has been president since 1931 and has spent 55 years with the company. He also started in the Beloit plant. His grandfather, Charles Hosmer Morse, was founder of the company and was chairman of the board upon his death in 1921. It was in 1847 when he bound himself out for $50 a year to learn the scale business with the firm which later became the present company.

Eggelhof Engineers to Represent Fulton-Sylphon

Fulton Sylphon Division of Robertshaw-Fulton Controls Co., Knoxville, Tenn., manufacturer of temperature controls, bellows devices, and bellows assemblies, has announced the appointment of Eggelhof Engineers, with offices at Tulsa, as district sales representatives. Hugh Brightwell is sales engineer for Eggelhof.

Couch Joins Bucyrus-Erie As Service Engineer

The recent appointment of William Couch as service engineer attached to the Evansville, Ind., office has been announced by Bucyrus-Erie Co., South Milwaukee, Wis. He will handle service work on the company's line of oil-well drills in the Michigan, Ohio, Illinois, Kentucky, and West Virginia territory.

Couch was associated with the H. C. Williams Drilling Co. of Grand Rapids, Mich., for 6 years, the last 3 years as drilling superintendent. Most recently he worked for Ford Oil Co., Holland, Mich., where he operated Bucyrus-Erie 28-L spudders.

Lee Rubber Announces Executive Changes

O. S. DOLLISON

E. M. IKIRT

Two important executive changes have been announced by A. A. Garthwaite, president, Lee Rubber & Tire Corp.

O. S. Dollison, formerly vice president and general manager of Republic Rubber Division, has been elected vice president of Lee Rubber & Tire with headquarters at Youngstown, Ohio. E. M. Ikirt, formerly assistant treasurer of Republic Rubber Division, has been appointed general manager of Republic Rubber.

J. C. Failing Appointed Representative to Mexico

The appointment of Jay C. Failing as agent for Mexico has been announced by George E. Failing Supply Co., manufacturers of portable exploration and water-well drilling equipment, of Enid, Okla.

For the past several years, J. C. Failing has been serving as West Coast representative. He will continue to handle this territory in addition to his Mexican assignment.

Kaiser Steel Announces Promotions for Two

Kaiser Steel Corp. has announced the promotions of two veterans of the iron and steel industry, George B. McMeans to be works manager and Edward J. Duffy as general superintendent of the Kaiser steel plant at Fontana, Calif. Jack L. Ashby, vice president and general manager of Kaiser Steel, said that the promotions are effective immediately, McMeans succeeding F. M. Rich, who has resigned, and Duffy succeeding McMeans as general superintendent.

McMeans was graduated from Lehigh University in 1935 with a degree in metallurgical engineering. Immediately upon graduation, he started general engineering training in all departments of John A. Roebling's Sons Co. where he became superintendent of the open-hearth and hot-mills division in 1942. In 1947 he joined the Kaiser Fontana plant as assistant general superintendent. By November 1948 he was elevated to the general superintendency.

Duffy, the new Fontana general superintendent, is a veteran of 30 years in the iron and steel industry. Upon graduation from high school in 1919, he joined Carnegie-Illinois Steel Corp. at Duquesne Works, Duquesne, Pa. He remained with Carnegie Steel until December 1942, when he joined Henry Kaiser as general superintendent of the Fontana iron-production division and was employed in that capacity until he was promoted to superintendent of the division.

S & J Opens New Factory Branch Office at Tulsa

Shand & Jurs Co., Berkeley, Calif., manufacturers of petroleum refining, transportation, and storage-equipment fittings, has announced the opening of its new factory branch office in Tulsa.

Breen Ringland has been appointed division manager at the Tulsa office. He will be responsible for consultation on engineering, manufacturing, field, and operational problems of petroleum companies located in Oklahoma, Kansas, Arkansas, and parts of Missouri.

Ringland joined S. & J.'s sales organization in 1946. After a period at the S. & J. factory, he was transferred to the Chicago office where he was subsequently named assistant manager of that branch, and served in that capacity until his recent appointment to head the Tulsa division.

U. S. Steel Supply Names Two to New Positions

M. J. Aurelius, sales vice president of United States Steel Supply Co., warehousing subsidiary of United States Steel Corp., has announced the appointments of William C. Etheredge as general staff manager, general sales department, and of Harold A. Miller as sales personnel division manager in the general sales department.

Etheredge succeeds Eugene G. Sheasby, who has been named assistant district manager for the company's Pittsburgh warehouse. He has been associated with the company since 1945, and for the past year has been manager of the market-development division.

Miller, who will maintain offices in the company's headquarters in Chicago, has been assistant in the sales personnel division of United States Steel Corp.

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$12.00 a column inch one issue . . .
10% Discount three or more issues.

EQUIPMENT FOR SALE

FOR SALE: 1—36-L Bucyrus Rig, 1948 model, complete with all tools. Phone 2032, Henderson, Kentucky.

SEISMOGRAPH EQUIPMENT FOR SALE: Two 2-Ton Chevrolet Coleman 4-Wheel Drive water trucks. 500 gallon tank completely winterized, vacuum fill, Tulsa winch, etc. Excellent condition, low mileage. Original Cost $6600.00—Sale Price $4000.00.

One ½-Ton Chevrolet crew and field service unit. Bed enclosed with steel, cab with heater, 65 gallon gas tank with gear pump, 7:50 x 15 tires. Low mileage. Original Cost $2800.00—Sale Price $1800.00. Riverside-6811, Dallas, Texas.

BOILERS FOR SALE: 18 Code Oil Field Boilers, 50 to 87 H.P., 100 to 200 Lbs. W.P., Operated under Hartford into 1948, not fired since. Located on Leases vicinity Pampa, Texas. Offered subject to prior sale $500.00 to $700.00 Each, as is where is. Contact W. L. Godfrey or Max Harbison, Kewanee Oil Company, Pampa, Texas.

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-8064—Houston, Texas

5,000 FEET
NEW 26" OD STEEL PIPE

.281 wall
77.25 lbs. per foot
40 foot lengths

Priced below mill for immediate delivery.

SONKEN-GALAMBA CORPORATION
2nd and Riverview (X-580)
Kansas City 18, Kansas
THatcher 9243

FOR SALE

25,000' 2" Non-Upset 4.6# New Seamless J-55 Range 2 Tubing, $35.00 Cft., FOB Pittsburgh, Pa.

40,000' 4" OD New Invasion Pipe 4½" OD Ends Grooved for Victaulic Couplings. All 20' Lenghts. $25.00 Cft., FOB St. Louis, Mo.

Other Sizes Line Pipe and Casing Available. For Prices Contact

A. J. STRUBEL
Sidney 1731 5060 Pernod
St. Louis, Mo.

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: In West Texas, Model 61 Wichita Spudder, complete with 150 H.P., LeRoi Drilling Engine, all tools, dog house, light plant, and Shear Pole Mast. Rig is mounted on 12" I Beam Skids. Box D-228, The Oil and Gas Journal, Tulsa, Oklahoma.

REBUILT BOILERS

90 HP Donovan Oilfield Boiler 175# SWP Complete with standard trim. Peerless Boiler Company, 421 North Cincinnati, Tulsa; 2015 NE Park Place, Oklahoma City.

EQUIPMENT FOR SALE

FOR SALE: Two complete electrical generating units; 100 kw., 480 volts; 3 phase, each unit equipped with 120 hp. Superior Twin Cylinder Horizontal Gas-Diesel engines, including V-Belt drive, control panel and accessories. In good condition, major oil company. For information write Box D-435, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Two Type 8-80 HP Bessemer Gas Engines driving a Worthington Compressor 16 x 20 and a Laidlaw Compressor 32 x 20. Price $1200.00 each. Located at Desdemona, Texas. Desdemona Gasoline Co., 401 Danciger Bldg., Fort Worth, Texas.

BROWN STRAUSS CORP.

1546 Guinotte Ave., Kansas City 10, Mo.

Dismantling Two Major Oil Refineries

Unusual opportunity to pick up real bargains. Everything offered either in place, or knocked down ready to ship. Never before have prices been so low. Contact us at once for your needs, and get our prices.

1—55,000-Bbl.	Riveted	Steel	Tank	
1—37,900-Bbl.	"	"	"	
4—15,000-Bbl.	"	"	"	
7—10,000-Bbl.	"	"	"	
4— 5,000-Bbl.	"	"	"	
1— 4,800-Bbl.	"	"	"	
1— 4,300-Bbl.	"	"	"	
8— 3,775-Bbl.	"	"	"	
16— 3,500-Bbl.	"	"	"	
4— 3,100-Bbl.	"	"	"	
2— 2,700-Bbl.	"	"	"	
11— 2,000-Bbl.	"	"	"	
4— 1,600-Bbl.	"	"	"	
4— 1,500-Bbl.	"	"	"	
2— 1,100-Bbl.	"	"	"	
4— 1,000-Bbl.	"	"	"	
2— 350-Bbl.	"	"	"	
1— 300-Bbl.	"	"	"	

2—Spheroid Tanks—Riv., 750-Bbl. Capacity

PRESSURE TANKS AND VESSELS

5—10' x 30' x ½" thickness Capacity 18,000-Gal., Riv.
1—3' x 32' x 4" F.S. Reaction chamber 1" concrete-lined
1—10' x 32' x 1¾" Riveted and Welded Reaction Chamber, Heads 1¾"
2—9' x 33' x 1 7/8" Riveted and Welded Reaction Chamber, Heads 1⅞
1—9' x 39' x 1 7/8" Riveted and Welded Reaction Chamber, Heads 1⅞
1—6' x 35' x 1"—200 PSI Reaction Chamber, F.S. Figd. Heads
2—4' x 21' x 1" Figd. Hd. Reaction chamber, F.S. Figd. Heads

Many other Vessels ½" Wall Thickness and heavier. 3' to 8' Diameter, 6' to 24' long.

Centrifugal Pumps—1, 2 & 3-stage; direct connected to electric motors and steam turbines

Steam-driven Air Compressors

Reciprocating Pumps—Steam and electric-driven, for Hot Oil, Products, Boiler Feed, Fire-Fighting and Water Pumps—sizes from 3x2x4 to 18x24x24—Gould Vertical Triplex Pump

2—AC Generators & Exciters, 125 KVA, 2400 volts, 30 Amps., 900/RPM

Heat Exchangers—List on application

Horizontal Steel Storage Tanks—3'x10' to 9'x23'—thickness ¼, ⅜ and ½"

Cast Iron & Steel Pipe—Valves, sizes 2" to 24"—Fittings—every size and kind. Cast Iron, Steel and Flanged

Steel Clothes Lockers, sets, from 2 to 10, sizes 15"x18"x6' high

2—250 H.P. Heine Water Tube Boilers, approved for 170# pressure

Flash Tower 10'x40'—13/16" thick x 1" head. Riv., upper part stainless steel-lined, 3 trays, 63 Bubble caps per tray, 75 PSI, 750 degrees

Other Towers—3'6"x50' to 10'x52', all with trays—
Absorbers, Dephlegmators, Evaporators, Bubble and Vacuum Towers

15,000 ft. 4½" O.D. Seamless Steel Pipe approx. 30 ft. lengths. Plain ends, weight per ft. 14.5#. Used but in excellent condition. Offered at a very attractive price.

Many other items too numerous to list. Write for booklet, or arrange for personal inspection.

EQUIPMENT FOR SALE

FOR SALE: 5½ Keystone, complete with all tools, in good shape; two trucks and two shallow producing wells in center of 640 acres. Shallow wells fully equipped and pumping. Inland Oil Co., 1940 Mentor, Wichita, Kansas.

FOR SALE: One Wichita 66 Spudder and two D-13000 Caterpillar Diesel Motors. Excellent condition. For further information, call or write Harold Montgomery, Box 748, Farmington, New Mexico.

FOR SALE: One, type-100 National Drilling Rig has drilled only two wells. With 800,000 pounds capacity jack-knife derrick. Box D-448, The Oil and Gas Journal, Tulsa, Oklahoma.

2" LINE PIPE

40,000 ft. 2⅜" OD 3.65#, 40' DRL. Plain End. Installed new for gas line 1942, like new condition.

Location: Camp Gruber, Okla.

MID-STATES PIPE & SUPPLY CO.
Ph. 2-9128 Tulsa, Okla.

ELECTRIC MOTORS

	H.P.	VOLTS	PH.	CYC.
1 West.	15	440	3	60
1 U. S.	25	440	3	60
17 West.	25	440	3	60
7 West.	30	440	3	60
7 West.	40	440	3	60

These motors have been reworked, rewound, and are in good condition.

50% of new price.

For prices and details write:

The Chicago Corporation
P. O. Box 1702
Corpus Christi, Texas

SPECIAL OFFERING
TOWERS—A-1 Condition
Immediate Delivery

One Stripper Column—12' I.D. x 66' tangent to tangent x ¾" thick shell and heads, ASME-API code constructed stress relieved and radiographed, 29 Carbon Steel trays and caps on 2' spacing, 100# @ 200° F., mounted on 12' I.D. x 9'4" high x ⅜" thick skirt.

Two Extractor Columns, 12'6" I.D. x 85'5" tangent to tangent x 1" thick shell x ⅝" thick hemispherical heads, 40 Carbon Steel trays on 2' spacing, 150# @ 300° F., radiographed, mounted on 12'6" I.D. x 16'7" high skirt.

Write, Wire, Phone for Listings

DULIEN STEEL PRODUCTS, INC.
of Washington
P. O. BOX 667
COTTON VALLEY, LA.
PHONE: COTTON VALLEY 26

EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES. E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

FOR SALE
(SUBJECT TO PRIOR SALE)

3 Bolted tanks, 2 in original crates and one assembled, (100 Bbl.), 69'-14" 57# Drive Pipe; 170'-10¾" 41# Drive Pipe; 407'-10¾" 32.75# Casing 8Rd. Thd. Smls.; 3045'-8" 24# Casing 8Rd. Thd. Smls.; 6286'-7" 23# Casing 8Rd. Thd. Smls.; 8101'-3" 9.20# Tubing Smls.; 1453'-2½" Tubing EUE Smls.; 14,226'-2" 6.40# Regular 10Rd. Thd.; 375'-¾" Pumping rods; 9-5" Orbit Gate Valves; 9-3" Orbit Gate Valves; 3-2" Orbit Gate Valves; 3-2⅞" x 6" Parmco Combination Packer; 1-2⅞" x 6" Larkin Screw Trip Packer; 1-3" x 6" Parmco Packer; 1-2⅞" x 6" Gas Anchor Packer. M. B. Belden Office at 425 2nd St. N. W., Canton 2, Ohio, Phone 4-6147.

FOR SALE: Two steel mud tanks, 5 feet by 8 feet; 30 feet long, made of ¼" steel, sloping bottom. Never been used. $2,500.00. Located Makin Drilling Company's yard, Hobbs, New Mexico.

FOR SALE—127' "Oilwell" Drilling Mast, 515,000 capacity, complete with six-foot substructure. Call or write H. Waggoner, Phone 64-1413, or P.O. Box 4657, Oklahoma City, Okla.

FOR SALE: 87' Lee C. Moore Jack-knife derrick, 6'-8" X 36' substructure, floor extensions, hand rails, near Corpus Christi, Texas. Price $7,000.00. Falco Drilling Company, Alice, Texas.

ONE new 40' x 40' x 12' corrugated aluminum building; double sliding door; single door and window; steel structure. Located: Bunkie, Louisiana. Anchor Gasoline Corp., Phone 54-5201, Tulsa, Oklahoma.

BLOCKS AND HOOKS: Used Ideal sheaves 30" with 5½" spring roller-bearing hook, good condition—$475.00 (less than ⅓ new cost). Nearly all sizes good used blocks and hooks in stock. Pressey & Son, Pueblo, Colorado.

FOR SALE: Grinding machines for reclaiming used stainless steel ball valve seats from ¾" to 2¼" Ball sizes. Save 75%. Write for details. The Ball Valve Seat Grinder Co., 102 Jamesville Rd., DeWitt, New York (suburb of Syracuse).

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Gaso, Byron Jackson, Aurora, Wayne, Lombard, & Hale Fire Pumps with Engines, 1½ to 25 KW Generator Sets or Light Plants, Engines, Suction Hose, Fire Hose, Victaulic Couplings & Etc. Write for listing. H. A. McCarthy, 310 Thompson Bldg., Phone 5-3296, Tulsa, Oklahoma.

ONE Skid mounted 5 x 10 Gardner Denver Pump with 525 Buda Engine used to drill five shallow holes—$3000.00. Riverside-6811, Dallas, Texas.

EQUIPMENT WANTED

WANTED: 28-L SPUDDER
Complete with tools from user. L. Woodrow, Box 400, Danville, Kentucky.

WANTED

Centrifugal pump that will handle maximum 800 to 1,000 bbls. crude oil per hour and 400# discharge pressure to connect to 125 or 150 h.p. electric motor. Full 440-220 volts. Phone or wire

O. M. MILLIORN,
BELL GENERAL PIPE LINE CO.
Gladewater, Texas, Phone 435.

INTERESTED in small portable double-mast rig, capable of drilling to approximately 2000 feet, with or without drill pipe. Equipment must be in good condition and reasonably priced. Preferably located in Southwest Texas. Contact:

MAKIN DRILLING COMPANY
Box 131, Hobbs, New Mexico, Phone 131

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90,000 ACRES with minerals, South Central Colorado. Some bottom meadow, good grass, creek water. Write for description. A real buy at $6.50 per acre. Guy Speakman, 1326 East Kiowa, Colorado Springs, Colorado.

HELP WANTED

WANTED! Salesmen in essential areas to call on production superintendents. Write for particulars. The Ball Valve Seat Grinder Co., 102 Jamesville Road, DeWitt, New York (Suburb of Syracuse).

WANTED by well established, adequately financed independent oil company spending on development near two million dollars annually, for executive position, experienced geologist familiar with North and West Texas. Must be man of broad experience in geological work. Applicant must be not more than 40 years of age. Satisfactory salary. If not employed now, do not apply. Correspondence strictly confidential. Box D-445, The Oil and Gas Journal, Tulsa, Okla.

FOREIGN and Domestic Oil Employment Directory (including late supplement of oil companies and drilling contractors in Western Canada). Over 500 listings in drilling, production, refinery, natural gasoline, pipelines, geological, exploration, supplies, manufacturers, services and refinery and pipeline contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (Our 30th year)

ENGINEERS, Executives, Technical Men. Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

WANTED: Superintendent for High Pressure Absorption Plant. Give operational and educational background, age, and salary expected. Box D-451, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED
Assistant Superintendent for Petro-chemical Plant. Chemical Engineer with at least ten years operating experience in petroleum refining or petrochemical plants. Box D-453, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

Experienced salesman to contact gasoline dealers and diesel oil accounts in Western Kansas, Colorado and Nebraska. Give full details, past experience, family status, when available, etc.

Shallow Water Refining Company
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Experienced ENGINEER familiar with Oil Refinery design and capable of estimating process equipment from flow diagrams.

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PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418 815-15th Street, N.W., Washington 5, D. C

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SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

SUPERINTENDENT. Process supervisor, chemist, experienced in complete refinery operations. Desires change. Familiar with distillation, cracking, reforming, polymerization, and treating. 17 years experience. Proven administrative and technical ability, considerable attention given to cost analysis. Box D-440, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED CHEMICAL ENGINEER, ten years broad experience natural gasoline, LGP, plant operation, estimates, purchasing, design, some construction; four years army officer; now plant superintendent; wants change. Resourceful, cost-conscious, cooperative. Age 38, family. Box D-444, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER: 13 years experience, drilling, completion, production, and work-over, Mid-Continent and Gulf Coast areas. Box D-431, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: 16 years experience in petroleum and chemicals. Engineering and plant production supervision. Desires supervisory position with an opportunity to help you. Box D-452, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINING AND PRODUCTION MATERIAL MAN, experience in Auditing, Inventory, Control, Lease Mapping, Purchasing and Sales. Can furnish the best of references. Age 35. Box D-450, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT - Office Manager - Auditor desires connection with independent oil company that would appreciate a fully qualified middle aged man who is presently employed. Box D-456, The Oil and Gas Journal, Tulsa, Okla.

WANTED

DRILLING DEALS, proven and semi-proven acreage wanted. Also royalties and producing properties. Send full particulars in first letter to P. O. Box 2161, Cincinnati 1, Ohio.

ESTABLISHED oil tool manufacturer with own sales organization is interested in securing California sales distribution for oil field products, or will manufacture on a licensed basis. Box D-454, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: SURPLUS Chemicals, Oils, Waxes, Solvents, Wastes and Residues of all kinds. Chemical Service Corporation, 98-06 Beaver St., New York 5, N. Y.

WANTED—PRODUCTION

Will buy producing properties in Texas and/or Oklahoma. Must deal direct with owner. Mail description data to: Box D-433, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

WANTED

DRILLING CONTRACTOR

Who will purchase for cash complete Wilson Giant Rotary Rig now set up in Southwestern Wyoming. As a consideration for purchase at a fair price, owners will give contracts in same area for drilling a number of wells on 12,000 acre block government leases with excellent potentialities for oil and gas. Substantial part of lease block offsets production. This is excellent opportunity to conclude continuous drilling program and participation. **Please address Charles Altmore, 4012 North Second Street, Albuquerque, by letter only.**

PRODUCTION FOR SALE

SHALLOW OLD PRODUCTION, 250 feet, 12 wells, lime production, eight bbls. a day; Bowling Green, Kentucky. Joseph Thomas, 50 Radnor Circle, Grosse Pointe 30, Michigan.

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LOGS of 8 gas wells drilled on my 640 acres to top of Mississippi lime 700 feet definitely show pronounced structure, a most excellent opportunity for Arbuckle Pool at 1050 feet, will give controlling interest for a well cost $6,500.00. Write Box 254, Chetopa, Kans.

8,000 Acres Van Buren County, Arkansas. Anyone interested in good block for development on plant anticline write or wire W. S. Stephenson, Clinton, Arkansas.

SHALLOW Production, Kentucky. Sell half interest in lease, drill and equipment, ten wells—$25,000.00. Real opportunity here. Box 104, Carmi, Illinois.

OWN in fee several thousand acres of land located in South Texas close to producing oil fields. Commands favorable geology. Holder would consider accepting treasury stock in a developing organization for a lease contract. Address Opportunity: Box D-438, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL BUY lease block 1000 acres or more with good geology for 4000 foot production. Give full information, geology and price. Box D-437, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Oil and Gas Leases and drilling propositions in shallow territory of Allen, Simpson, and Warren Counties, Kentucky. W. P. Harley, Bowling Green, Kentucky.

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Stewart Joins Climax as Assistant Sales Manager

Paul Stewart has joined Climax Engine & Pump Manufacturing Co. as assistant general sales manager, Southern division. For the past 5 years Stewart has been associated with Carson Machine & Supply Co., formerly as manager of the Kansas district, and for the past 2 years as manager of the engine division. He will make his headquarters at Dallas.

ADVERTISERS

Aerotec Corporation, The 31
Air Reduction Sales Co. 11
American Hoist and Derrick Company 143
American Iron & Machine Works Co. 100
Anchor Petroleum Company 52
Ansul Chemical Co. 144
Baash-Ross Tool Company 102
Baker Oil Tools, Inc. 54
Baldwin-Duckworth Division of Chain Belt Company 17, 18
Baroid Sales Division, National Lead Company 19
Bethlehem Supply Co. 1
Bovaird Supply Co., The 20
Boyd, Co., Clarence L. 131
Boyles Galvanizing Co. 150
Buffalo Forge Company 123
Byron Jackson Co. Front Cover
Camco Inc. 48
Cameron Iron Works, Inc. 25
Cannon Electric Development Company 131
Chain Belt Co. 17, 18
Chamber of Commerce of Denver 87
Chapman Valve Mfg. Co., The 29
Chicago & Southern Air Lines 145
Chicago Bridge & Iron Company Inside Front Cover
Classified Advertising 163, 164, 165
Core Laboratories, Inc. 94
Crane Co. 5
Crose Manufacturing Co., Inc., M. J. 98
Crutcher-Rolfs-Cummings 127
Cummins Sales & Service 47
Dean Brothers Pumps, Inc. 146
Dempsey Pump Co. 114
Detroit Diesel Engine Division, General Motors Corp. 88, 89
Dow Chemical Co., The 49
Dowell Incorporated 120
Dresser Industries, Inc. 91
Drilling & Service, Inc. 154
Dunning-Jones, Inc. 128
Eagle-Picher Sales Co. 90
Fischer & Porter Co. 116
Fluor Corporation, Ltd., The 136
General Electric Company 12, 13
General Electric Co., Electronics Dept. 43, 44
Goodall Rubber Company 140
Goodrich Company, B. F. 3
Grancell, I. H. 133
Grant Oil Tool Co. 152
Graver Tank & Mfg. Co., Inc. 139
Gunite Concrete & Construction Co. 137
H & M Pipe Beveling Machine Co. 129
Haering & Co., Inc., D. W. 113
Harnischfeger Corp. 16
Harper Company, H. M. 131
Hughes Tool Co. Back Cover
Hunt-Spiller Manufacturing Corp. 2
Jones & Laughlin Supply Co. 38, 39
Keasbey & Mattison 6
Kinzbach Tool Co., Inc. 146
Kobe, Incorporated 91
Koppers Company, Inc. 4, 36
Lane-Wells Company 110
Latex Construction Company 129
Layne & Bowler, Inc. 27
LeBus Rotary Tool Works, Inc. 135
Lehmann Machine Co. 155
Levingston Shipbuilding Co. 37
Leyman Manufacturing Corp. 131
Lucey Export Corp. 26
Magnet Cove Barium Corp. 35
Master Tank & Welding Co. 126
Metal Goods Corporation 23
Midwestern Engine & Equipment Co., Inc. 97
Minnesota Mining & Mfg. Co. 21
Moon Brothers, Ltd. 145
Mountain Iron & Supply Co. 128
Murphy Diesel Company 9
National Airoil Burner Co., The 137
Norris Manufacturer, Inc., W. C. 50
Novo Engine Company 147
Oil Base, Inc. 93
Oil Well Supply Co. 14
Onan & Sons, Inc., D. W. 129
Overstrom & Sons 146
Page Fence Association 134
Pennsylvania Flexible Metallic Tubing Co. 30
Perrault Brothers 129
Petroleum Distributing Co. 134
Petroleum Electric Power Association 15
Pipe Line Service Corp. 130
Pittsburgh Coke & Chemical Co. 99
Pittsburgh Plate Glass Company, Industrial Paint Division 32
Plastic Coating Corp. 153
Republic Rubber Division of Lee Rubber & Tire Corp. 34
Republic Steel Corporation 42
Rolo Manufacturing Co. 142
Ross Heater & Mfg. Co., Inc. 8
Santa Fe System Lines 46
Saran Lined Pipe Company 49
Scott-Rice Company 133
Security Engineering Co., Inc. 148, 149
Shand & Jurs Co. 24
Skinner Company, M. B. 127
Smith Corporation, A. O. 28
Snap-On Tools Corporation 138
Standard Oil of Indiana 45
Standco Brake Lining Co. 133
Sun Engineering Company 116
Swan Oil Well Treating Co. 112
Taylor Chain Co., S. G. 135
Taylor Forge & Pipe Works 118
Thermix Corporation, The 31
Thermoid Company 40
Thomas Flexible Coupling Co. 108
Thornhill-Craver Co. 85
Timken Roller Bearing Company, Steel & Tube Division 7
Toro Manufacturing Corp. 128
Torrington Company, The 22
Trans-Texas Airways 153
Tretolite Company 10
Tube-Kote 105
Tube-Turns, Inc. 106, 107
U. S. Steel Corp. Subsidiaries 14
United Supply & Manufacturing Co. 33
Universal Oil Products Co. 137
Viking Pump Co. 147
Visco Products Co., Inc. 71
Wilson Manufacturing Co., Inc. 125
Wilson Oil Tools, Web 132
Wood's Sons Co., T. B. 135
Wyodak Chemical Division, The, of the Federal Foundry Supply Company 41
Youngstown Sheet and Tube Company Inside Back Cover
Zonolite Company 116

CALENDAR

April

American Chemical Society, Detroit meeting, Detroit, April 16-20.

Petroleum Industry Electrical Association and Petroleum Electric Supply Association, joint conference, Shamrock Hotel, Houston, April 18-20.

American Petroleum Institute, Division of Marketing, Muehlebach Hotel, Kansas City, April 24-25.

Natural Gasoline Association of America annual convention, Texas Hotel, Fort Worth, April 24-26.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, joint annual meeting, Stevens Hotel, Chicago, April 24-27.

Oil Heat Institute of America and National Oil Heat Exposition, annual meeting, Commercial Museum, Philadelphia, April 24-May 1.

American Petroleum Institute, Division of Production, eastern district meeting, Cleveland Hotel, Cleveland, April 26-28.

May

American Petroleum Institute, Division of Refining, midyear meeting, Hotel Cleveland, Cleveland, May 1-4.

Interstate Oil Compact Commission spring meeting, Biloxi, Miss., May 4-6.

National Stripper Well Association, Biltmore Hotel, Los Angeles, May 7-9.

Independent Petroleum Association of America, midyear meeting, Biltmore Hotel, Los Angeles, May 7-9.

American Gas Association, Natural Gas Department, spring meeting, Mayo Hotel, Tulsa, May 8-9.

Liquefied Petroleum Gas Association, annual convention, Palmer House, Chicago, May 8-11.

American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles, May 11-12.

American Petroleum Institute, central committees on accident and fire prevention, midyear meeting, Atlantic City, N. J., May 15-18.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 22-24.

American Institute of Chemical Engineers, regional meeting, New Ocean House, Swampscott, Mass., May 28-31.

Gas Technology Short Course, Texas College of Arts and Industries, Kingsville, Tex., May 29-31.

June

National Oil Scouts and Landmen's Association, Skirvin Tower Hotel, Oklahoma City, June 8-10.

American Society of Mechanical Engineers, oil and gas power division, Lord Baltimore Hotel, Baltimore, June 12-16.

Pennsylvania Grade Crude Oil Association, Hotel William Penn, Pittsburgh, Pa., June 15-16.

Petroleum Equipment Suppliers Association, annual membership meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., June 18-20.

American Society of Mechanical Engineers, Hotel Statler, St. Louis, June 19-23.

Canadian Gas Association, annual convention, Manoir Richelieu Hotel, Murray Bay, Quebec, June 19-24.

Kentucky Oil and Gas Association, annual meeting, Lexington, Ky., June 22-23.

American Society for Testing Materials, annual meeting Chalfonte-Haddon Hall, Atlantic City, N. J., June 26-30.

American Petroleum Institute, midyear division of production and standardization conference, Brown Palace Hotel, Denver, June 28-30.

July

Institute of Petroleum, oil shale and cannel coal conference, Glasgow, Scotland, July 3-7.

August

Interstate Oil Compact Commission, summer meeting, French Lick, Ind., August 3-5.

September

National Chemical Exposition, Chicago Coliseum, Chicago, September 5-9.

American Society of Mechanical Engineers and Instrument Society of America, Municipal Auditorium, Buffalo, N. Y., September 11-15.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 13-15.

American Society of Mechanical Engineers, petroleum mechanical engineering conference, Roosevelt Hotel, New Orleans, September 25-27.

Instrument Society of America, annual instrument conference and exhibit, Memorial Auditorium, Buffalo, N. Y., September 18-22.

October

American Gas Association, annual convention, Atlantic City, N. J., October 2-6.

Mid-Continent Oil and Gas Association, Texas division, Dallas, October 4-5.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads: May 10, annual invitation dinner, Louis Sherry's, and June 13-15, golf party, Westchester.

TABLE OF CONTENTS ON PAGE 53

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